Soil Survey Investigations Report No. 4

Soil Survey Laboratory Data and Descriptions for Some Soils of...

...KANSAS

SOIL CONSERVATION SERVICE · U.S. DEPARTMENT OF AGRICULTURE
In cooperation with
KANSAS AGRICULTURAL EXPERIMENT STATION

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1. SAMPLE COLLECTION AND PREPARATION
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      2. <size specified
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      tr: trace, not measurable by quantitative procedure used or less than reportable amount
      tr(s): trace, detectable only by qualitative procedure more sensitive than quantitative procedure used
      : analysis run but none detected
      -(s): none detected by sensitive qualitative test
      blank: analysis not run
      nd: analysis not run
      <: less than reported amount or none present
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   4. KCl-TEA extraction
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O. Magnesium
   1. Saturation extract
      a. EDTA titration
   2. NH_4OAc extraction
      a. EDTA-alcohol separation
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      a. EDTA titration
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      a. Flame photometry
Q. Potassium
   1. Saturation extract
      a. *Flame photometry*
   2. NH_4OAc extraction

PREFACE

This publication is one in a new U.S. Department of Agriculture series established to preserve and make available technical information resulting from soil survey investigations. These investigations have been going on for about two decades. Data from them have been distributed in unpublished form to those immediately concerned. Some of the data and descriptions have appeared in technical journals, in regional bulletins, in USDA technical bulletins, and in the text of published soil surveys. But most were not available to all who might use them.

We intend to publish in this series all data from the soil survey laboratories that form reasonably complete characterizations of soils. Already-assembled data and descriptions will be published just as rapidly as they can be prepared for printing. Fragmentary data collected as reference points for specific soil surveys will not be included.

While these data were being assembled, there were many changes in laboratory methods. Some were improved and some new ones were devised. Consequently, laboratory data for different soils cannot always be directly compared without allowance for the method.

The method used is indicated by symbol in the column headings of the data table. These symbols are identified in the code sheet on the opposite page. Each method is described in the first number of this series, "Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples," SSIR No. 1.

Ways of describing soils have also changed. Soil descriptions have become explicit on more and more features. The systems for designating horizons and for classifying soils have been changed.

The soil descriptions published here were prepared as working documents to meet a specific need of a soil survey at the time the soil samples were collected. The soil scientists who wrote them had no idea they would be published. Editing has been limited for the most part to that necessary for conformance to the "Soil Survey Manual." Field textural estimates have been retained, even though some are at variance with the laboratory data, because the field estimates themselves are important data.

There were several reasons for sampling these soils. Some were sampled to study soil genesis, some to facilitate classification, and some to obtain data to permit more useful interpretations. Those sampled for genesis or classification studies do not always fit neatly into our present concepts of soil series. Partly because of these studies, our concepts of some soil series have been modified. As a consequence, the soil series name assigned a soil at the time of sampling is not always the name that would be assigned today. Soil series names in this publication follow 1965 series definitions.

Soil Survey
Soil Conservation Service

KANSAS

County	Soil Series	Soil Survey No.	Page
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	Carwile	S58Kans-78-10	7
	Carwile	S58Kans-78-11	9
	Tivoli	S59Kans-78-1	71
	Tivoli	S59Kans-78-2	73
	Farnum	S58Kans-78-5	23
	Farnum	S58Kans-78-9	25
	Pratt	S58Kans-78-6	57
	Pratt	S58Kans-78-12	59
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Republic	Muir	S53Kans-79-2	47
	Muir	S53Kans-79-4	49
Saline	Ebenezer	S53Kans-85-3	19
	Ebenezer	S53Kans-85-4	21
	Lancaster	S53Kans-85-5	39
	Lancaster	S53Kans-85-6	41
	Lockhard	S53Kans-85-1	43
	Lockhard	S53Kans-85-2	45
Shawnee	Muir	S53Kans-89-1	51
	Muir	S53Kans-89-2	53

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Bethany silt loam LOCATION Reno County, Kansas

SOIL NOS. S58Kans-78-3 LAB. NOS. 8063-8071

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 <19mm	
0-7	Ap	0.3	3.3a	3.4a	4.5a	10.5a	54.1	23.9	50.8	15.6	Tr.	sil
7-11	A3	0.6	3.3a	3.2a	3.3a	9.1a	47.2	33.3	41.9	14.8	-	sicl
11-16	B1	1.4	4.4a	3.0a	4.6a	6.8a	41.8	38.0	35.0	15.6	Tr.	cl
16-27	B21t	1.8	3.2a	1.8a	3.1a	7.2a	45.3	37.6	37.5	16.5	Tr.	sicl
27-36	B22t	0.3	1.7a	1.7a	3.5a	9.4a	47.1	36.3	42.0	16.3	Tr.	sicl
36-45	B23t	1.4b	1.5b	1.5b	1.5b	9.7b	49.9	34.5	42.2	17.5	Tr.	sicl
45-60	B31ca	1.6c	1.1c	1.2b	1.4b	7.4b	57.8	29.5	38.6	26.9	6.5	sicl
60-76	B32ca	0.7d	1.0d	1.1d	2.2d	6.8d	57.9	30.3	43.5	22.3	3.9	sicl
76-99	Cca	0.3c	0.6d	0.6d	1.2d	5.1d	68.8	23.4	39.5	35.0	2.0	sil

	pH 8C1a	ORGANIC MATTER 6A1a ORGANIC	6B1a NITRO-	8A2 EST% SALT (BUREAU	ELECTRICAL CONDUCTIVITY	6E1a $CaCO_3$ equiv.	GYPSUM me./100g.	MOISTURE TENSIONS 1/10	1/3	4B2 15

Soil Type: Bethany silt loam.
Location: Reno County, Kansas. 330' W and 1320' N of S¼ Corner of Sec. 14, T25S, R5W. About 12 miles SE of Hutchinson.
Date of Sampling: May 5, 1958.
Collectors: Jordan, Rockers, and Otsuki.
Physiographic Position: Upland on Pleistocene mantle presumably old alluvium of loamy and clayey sediments. Elevation approximately 1500'.
Climate: Average annual precipitation about 28".
Topography: Nearly level; gradient about .5 percent.
Drainage: Runoff slow; permeability slow. Well drained.
Vegetation: Originally tall grass prairie.
Use: Cropland.
Description by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-3.

Lincoln Lab. No.			
8063	Ap	0-7"	Dark grayish brown (10YR 3.5/2 dry; 2.5/2 moist) heavy silt loam; weak granular; friable; noncalcareous; grades shortly to
8064	A3	7-11"	Very dark grayish brown (10YR 3/2 dry; 2/2 moist) light silty clay loam; strong moderate fine and medium granular with very thin patchy clayskins; moderately friable; few worm casts; noncalcareous; grades through 3" to
8065	B1	11-16"	Dark grayish brown (10YR 3.5/2 dry; 2.5/2 moist; 3/3 moist crushed) light clay; moderately strong fine subangular blocky with thin continuous clayskins; very firm; few fine open rootlet channels; noncalcareous; grades through 3" to
8066	B21t	16-27"	Dark grayish brown (10YR 4/2 dry; 3/3 moist crushed) clay; moderate fine and very fine irregular blocky with distinct continuous clayskins; very firm; few weak slickensides; noncalcareous; grades through 4" to
8067	B22t	27-36"	Dark grayish brown (10YR 4/2.5 dry; 3/3 moist crushed) clay; moderate fine irregular blocky with distinct continuous clayskins; very firm; few weak slickensides up to 1 sq. inch area; few rootlets in peds; noncalcareous; grades through 6" to
8068	B23t	36-45"	Brown (10YR 4.5/3 dry; 4/3 moist) clay; moderate medium and fine irregular blocky with distinct continuous clayskins; very firm; few fine faint mottles of strong brown; mass noncalcareous; less than 1% of fine hard concretions of $CaCO_3$; grades through 6" to
8069	[illegible]		

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Bethany silt loam **LOCATION** Reno County, Kansas

SOIL NOS. S58Kans-78-4 **LAB. NOS.** 8072-8079

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-6	Ap	0.6a	1.8a	1.6a	3.5a	10.3a	58.2	24.0	53.1	17.1	Tr.	sil
6-12	A3	0.6a	2.0a	1.4a	1.6a	9.8a	54.6	30.0	48.8	15.9	Tr.	sicl
12-17	B1	1.8a	2.3a	1.1a	1.2a	7.2a	49.4	37.0	41.0	15.9	Tr.	sicl
17-23	B21t	2.8a	2.9a	1.4a	1.7a	6.6a	43.0	41.6	35.8	14.6	Tr.	sic
23-38	B22t	1.8a	2.8a	1.2a	1.2a	7.0a	45.2	40.8	37.2	15.4	Tr.	sic
38-49	B23t	1.4b	3.1b	1.2b	1.6b	7.9b	46.4	38.4	39.6	15.4	Tr.	sicl
49-73	B31ca	0.8b	2.4b	1.4b	1.4b	7.6b	52.7	33.7	41.1	19.7	Tr.	sicl
73-96	B32ca	0.2b	1.2b	1.0b	1.0b	9.8b	53.4	33.4	44.4	18.9	Tr.	sicl

	pH 8C1a		ORGANIC MATTER 6A1a	6B1a		8A2	ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM 8A1a	6E1a		MOISTURE TENSIONS		4B2
	1:5	1:10	ORGANIC CARBON	NITROGEN	C/N	EST% SALT (BUREAU CUP)		$CaCO_3$ equivalent	GYPSUM ms./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1			%	%				%		%	%	%
6.0	6.4	6.4	1.83	0.139	13.2	<0.20	0.4					9.9
6.1	6.4	6.5	1.73	0.134	12.9	<0.20	0.4					12.3
6.4	6.8	6.9	1.23	0.097	12.7	<0.20	0.4					14.8
6.5	7.1	7.2	0.75	0.061	12	<0.20	0.4	<1				17.2
7.0	7.6	7.7	0.46	0.042	11	<0.20	0.5	<1				17.5
7.9	8.5	8.6	0.21			<0.20	0.6	1				17.0
8.0	8.6	8.7	0.04			<0.20	0.5	4				15.4
8.0	8.8	8.9	0.01			<0.20	0.5	2				15.4

5A1a	EXTRACTABLE CATIONS 5B1a					BASE SAT. %	SATURATION EXTRACT SOLUBLE 8A1					8A
CATION EXCHANGE CAPACITY NH_4Ac	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	NH_4Ac EXCH.	6P1a Na	6Q1a K				MOISTURE AT SATURATION
← milliequivalents per 100g. soil →						5C1	← milliequivalents per liter →					%
18.9	12.1	3.3	7.4	0.1	0.9	87	0.8	0.3				42.4
22.4	15.1	4.2	6.5	0.1	0.6	89	0.5	0.2				52.4
25.7	18.6	5.5	5.7	0.1	0.5	96	0.6	0.1				56.9
29.7	22.2	7.4	4.3	0.2	0.5	102	0.8	0.1				63.5
28.7	22.5	7.7	2.8	0.4	0.5	108	1.3	<0.1				68.2
27.1				0.6	0.5		2.3	0.1				64.7
23.4				0.8	0.5		2.6	0.1				92.5
21.8				0.9	0.6		2.7	0.1				77.8

Soil Type: Bethany silt loam.
Location: Reno County, Kansas. 1020' S and 206' E of NW¼ Corner, Sec. 4, T25S,R5W, about 10 miles SSE of Hutchinson.
Date of Sampling: May 6, 1958.
Collectors: Jordan, Rockers, and Otsuki.
Physiographic Position: Upland on Pleistocene mantle presumably old alluvium of loamy and clayey sediments. Elevation approximately 1500'.
Climate: Average annual precipitation about 28".
Topography: Nearly level; gradient about .5 percent.
Drainage: Runoff slow; permeability slow. Well-drained.
Vegetation: Originally tall grass prairie.
Use: Cropland, now in wheat.
Described by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-4.

Lincoln Lab. No.			
8072	Ap	0-6"	Dark grayish brown (10YR 4/2 dry; 2.5/2 moist) silt loam or loam; weak granular; friable; noncalcareous; grades shortly to
8073	A3	6-12"	Dark grayish brown (10YR 3.5/2 dry; 2/2 moist) light silty clay loam; strong moderate fine granular; moderately friable; few worm casts; noncalcareous, grades through 3" to
8074	B1	12-17"	Dark grayish brown (10YR 4/2 dry; 2.5/2.5 moist) heavy silty clay loam; moderately strong fine and very fine subangular blocky with weak patchy clayskins; firm; few wormcasts; few fine and very fine sand grains; noncalcareous; grades through 3" to
8075	B21t	17-23"	Dark grayish brown (10YR 4/2 dry; 3/2 moist; 3/3 moist crushed) light clay; moderate medium and coarse blocky breaking to weak [redacted] fine blocky with distinct continuous clay skins; very firm; few open rootlet channels; few fine concretions of iron; noncalcareous; grades through 4" to
8076	B22t	23-38"	Brown (10YR 5/3 dry; 3/2.5 moist) with fine vertical old cracks filled with darker material from above; clay; moderate coarse and fine irregular blocky with distinct continuous clayskins; few weak slickensides with area up to 2 sq. inches; very firm; few rootlets in peds; noncalcareous; grades through 6" to
8077	B23t	38-49"	Yellowish brown (10YR 5/4 dry; 4.5/3 moist) light clay, weak moderate fine irregular blocky with weak continuous clayskins; few weak slickensides with area up to 1 sq. inch; very firm; mass noncalcareous; few fine (1-3%) hard concretions of $CaCO_3$; grades through 6" to
8078	B31ca	49-73"	Light brown (7.5YR 5.5/4 dry; 5/4 moist) heavy silty clay loam; weak moderate fine subangular and irregular blocky with weak patchy clayskins; firm; mass noncalcareous; contains about 10% of fine to very coarse, soft and hard concretions of $CaCO_3$;

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Carwile fine sandy loam **LOCATION** Reno County, Kansas

SOIL NOS. S58Kans-78-10 **LAB. NOS.** 8124-8133

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-7	Ap	0.2	6.5	20.9	42.1	13.3	12.2	4.8	40.3	3.1	-	ls
7-11	A11	<0.1	4.1	16.1	30.2	14.7	16.9	10.0	43.2	5.0	-	fsl
11-19	A12	<0.1	4.4	16.2	40.5	14.2a	13.6	11.1	41.7	4.3	-	fsl
19-23	B21t	0.3	5.2	13.8	36.5	10.5a	16.4	17.3	37.7	6.6	-	fsl
23-29	IIB22t	<0.1	1.8	4.5	5.5	8.8a	39.3	40.1	30.3	17.9	-	c
29-46	IIB23t	<0.1	0.8	2.2	5.5	3.3a	51.9	36.3	33.8	24.1	-	sicl
46-55	IIB3	0.2	4.3	9.4	11.6	17.2a	36.4	20.9	40.7	13.8	-	l
55-68	IIIC1	0.5	8.4	15.5	30.5	10.2a	19.4	15.5	36.2	7.4	-	fsl
68-84	IIIC2	0.7	9.1	17.5	35.7	12.5a	12.5	12.0	37.9	4.4	Tr.	sl
84-104	IIIC3	0.4	6.2	13.6	34.0	14.7a	17.7	13.4	44.2	5.4	Tr.	fsl

DEPTH INCHES	pH 1:1	pH 1:5	pH 1:10	8C1a ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 4B1a 1/10 ATMOS. %	4B1a 1/3 ATMOS. %	4B2 15 ATMOS. %
0-7	6.5	6.7	6.9	0.43	0.042	10	<0.20	0.5	<1		11.3	6.6	2.1
7-11	6.3	6.6	6.8	0.57	0.060	10	<0.20	0.4			18.3	11.0	4.3
11-19	6.2	6.5	6.6	0.48	0.049	10	<0.20	0.4			21.1	11.6	4.6
19-23	6.4	6.6	6.7	0.48	0.048	10	<0.20	0.4					7.0
23-29	6.4	6.9	6.9	0.50	0.052	10	<0.20	0.4					16.1
29-46	6.5	7.1	7.1	0.23			<0.20	0.3	<1				15.5
46-55	7.0	7.3	7.3	0.10			<0.20	0.4	<1				8.9
55-68	7.0	7.3	7.2	0.06			<0.20	0.4	<1				6.7
68-84	6.7	7.0	7.0	0.05			<0.20	0.4	<1				5.2
84-104	7.1	7.4	7.4	0.02			<0.20	0.5	<1				6.3

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	SATURATION EXTRACT SOLUBLE 8A1 6P1a Na	6Q1a K	8A MOISTURE AT SATURATION %
	← milliequivalents per 100g. soil →							← milliequivalents per liter →		
0-7	4.1	2.5	0.5	1.4	<0.1	0.4	83	1.4	0.7	25.4
7-11	7.4	4.4	1.1	2.7	0.1	0.6	84	1.5	0.7	28.8
11-19	7.5	4.7	1.2	2.3	<0.1	0.4	84	0.8	0.4	30.6
19-23	11.9	8.1	2.2	3.7	<0.1	0.4	90	0.5	0.2	41.0
23-29	28.9	20.8	6.0	5.2	0.1	0.7	96	0.4	0.1	71.0
29-46	25.9	18.8	5.6	3.8	0.1	0.6	97	0.4	0.1	82.3
46-55	16.1	11.9	3.3	1.8	0.1	0.3	97	0.6	0.1	48.4
55-68	12.1	9.0	2.6	1.4	0.1	0.3	99	0.6	0.1	38.3
68-84	9.2	6.7	1.9	0.9	<0.1	0.2	96	0.6	0.1	36.9
84-104	10.5	8.6	2.1	1.4	<0.1	0.3	105	0.6	0.1	40.2

a. Few smooth black condr. (Mn?).

Soil Type: Carwile fine sandy loam.
Location: Reno County, Kansas. 270' N and 305' W of SE Corner of Sec. 21, T23S, R9W. About 14 miles west of Hutchinson.
Date of Sampling: May 8, 1958.
Collectors: Jordan, Rockers, and Otsuki.
Physiographic Position: Upland. Elevation approximately 1775'.
Climate: Average annual precipitation about 27".
Topography: Nearly level, concave, slightly depressional, eolian mantled, billowy upland.
Drainage: Water collects; very slow internally; water table is generally within 10'. 90 inches to water table on date sampled.
Vegetation: Originally prairie grasses.
Use: Cropland. Now in sorghum stubble.
Described by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-10.

Lincoln Lab. No.			
8124	Ap	0-7"	Grayish brown (10YR 5/2 dry; 3/2 moist) light fine sandy loam; structure destroyed by cultivation; very friable; grades shortly to
8125	A12	7-11"	Dark grayish brown (10YR 4/1.5 dry; 2/1.5 moist; 2/2 when through 2" to
8126	A12	11-19"	Dark grayish brown (10YR 4/2 dry; 3/2 moist) heavy sandy loam; faintly mottled with brown; porous massive; friable; grades through 2" to
8127	B21t	19-23"	Brown (10YR 4.5/2.5 dry; 4/3 moist) light sandy clay loam; common faint brown mottles of 1/4" diameter; weak subangular blocky; moderately friable; grades through 1" to
8128	IIB22t	23-29"	Grayish brown (2.5Y 5/2 dry; 3.5/2.5 moist) sandy clay; few fine faint, brown mottles; moderate medium irregular blocky with thick continuous clayskins; very firm; many open rootlet channels; grades through 4" to
8129	IIB23t	29-46"	Light olive gray (5Y 6/2 dry; 5/2 moist) sandy clay; moderate medium irregular blocky with thick continuous clayskins; very firm; few old cracks about 1/8 to 1/4" wide filled with material similar to the A_3 horizon; grades through 6" to
8130	IIB3	46-55"	Pale olive (5Y 6/3 dry; 5/3 moist) heavy sandy clay loam; weak coarse subangular blocky with vertical faces coated with clay-skins; firm; many fine rootlet channels and old crevices filled

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Carwile fine sandy loam **LOCATION** Reno County, Kansas

SOIL NOS. S58Kans-78-11 **LAB. NOS.** 8134-8142

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-7	Ap	1.9	11.0	18.1	39.5	14.1a	11.0	4.4	41.2	2.7	-	ls
7-13	A11	0.7	7.5	16.5	45.3	14.6a	8.9	6.0	43.8	2.9	Tr.	lfs
13-17	A12	1.5	12.0	19.1	40.7a	8.8a	8.7	9.2	34.1	2.8	Tr.	ls

Soil Type: Carwile fine sandy loam.
Location: Reno County, Kansas. 406' N and 267' W of east quarter corner of Sec. 18, T22, R9W. About 25 miles West NW of Hutchinson.
Date of Sampling: May 8, 1958.
Collectors: Jordan, Rockers and Otsuki.
Physiographic position: Upland. Elevation approximately 1750'.
Climate: Average annual precipitation about 27".
Topography: Nearly level, concave, slightly depressional, eolian mantled, billowy upland.
Drainage: Water collects; very slow internally; water table is generally within 15'. Water table was not found within 120" when sampled.
Vegetation: Originally prairie grasses.
Use: Alfalfa.
Described by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-11.

Lincoln Lab. No.			
8134	Ap	0-7"	Grayish brown (10YR 5/2 dry; 3.5/2 moist) light fine sandy loam; weakly granular; very friable; grades shortly to
8135	A11	7-13"	Dark grayish brown (10YR 4/2 dry; 3/2.5 moist) fine sandy loam; porous massive; very friable; grades through 2" to
8136	A12	13-17"	Brown (9YR 4/3 dry; 3.5/4 moist) fine sandy loam; few faint mottles of strong brown; porous massive; very friable; grades through 2" to
8137	B21t	17-21"	Brown (9YR 4/3 dry; 3.5/4 moist) sandy clay loam; common fine distinct mottles of strong brown; weak moderate medium subangular blocky; moderately friable; weak patchy clayskins; grades through 1" to
8138	IIB22t	21-33"	Dark grayish brown (2.5Y 4/2 dry; 4/2 moist; 4.5/2 moist crushed) sandy clay; common fine distinct mottles of strong brown; moderate fine irregular blocky with thick continuous clayskins; very firm; old cracks filled with material from above; common fine black mottles or streaks; many fine open rootlet channels; some partially clogged; grades through 3" to
8139	IIB23t	33-48"	Light olive gray (5Y 6.5/2 dry; 5.5/2 moist) sandy clay; common medium distinct mottles of olive; weak medium and coarse irregular blocky with distinct patchy clayskins; very firm; old cracks filled with material from above; vertical black streaks; few fine open rootlet channels; grades through 4" to
8140	IIB31	48-62"	Light gray (5Y 7/2 dry; 5.5/2 moist) sandy clay; common medium and coarse distinct mottles of olive yellow and strong brown; weak coarse irregular blocky with distinct patchy clayskins; very firm; fine black spots; old cracks filled with material from above; very few fine open rootlet channels; grades through 4" to
8141	IIB32	62-75"	Light gray (5Y 7/2 dry; 6/2 moist) sandy clay; common fine and medium distinct mottles of strong brown; moderate coarse irregular blocky and subangular blocky with weak patchy clayskins; very firm; seams and common fine concretions of $CaCO_3$; mass noncalcareous; grades through 6" to
8142	IIC	75-103"	Pale yellow (5Y 7/3 dry; 6/3 moist) light sandy clay with common fine distinct mottles of strong brown; moderate fine and coarse blocky with weak patchy clayskins; firm; mass noncalcareous; seams and fine concretions of $CaCO_3$.

Remarks: Horizons 0-7"; 13-17; and 33-48" were sampled for Bureau of Public Roads.
Moist to depth sampled.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/20/58

SOIL TYPE Colby silt loam **LOCATION** Hamilton County, Kansas

SOIL NOS. S57Kans-38-1 **LAB. NOS.** 5917-5922

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (19mm)	TEXTURAL CLASS
0-2	Ap	2.2a	6.4a	2.7	10.8	18.7	44.5	14.7	62.3	9.5	Tr.	1
2-6	A1	1.0b	2.0b	1.2b	10.7b	17.5b	47.6	20.0	61.3	12.9	1.3	1
6-15	AC	0.5b	1.7b	1.1b	8.2b	14.9b	48.0	25.6	52.8	17.0	Tr.	1
15-26	ACca	2.4b	1.9b	0.9b	5.8b	12.9b	51.8	24.3	50.0	19.7	2.2	sil
26-37	Cca	0.1b	0.4b	0.2b	5.1b	13.4b	59.6	21.2	57.0	20.6	Tr.	sil
37-60+	C	0.1	0.5b	0.3b	5.1b	14.8b	59.3	19.9	51.1	22.2	Tr.	sil

DEPTH INCHES	pH 1:1	pH 1:5	8C1a pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6E1a $CaCO_3$ equivalent %	GYPSUM mo./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
0-2	8.2	8.7	8.8	1.04	.098	10.6	3				7.4
2-6	8.3	8.7	9.0	0.98	.105	9	4				9.3
6-15	8.2	8.8	9.0	0.78	.090	9	9				11.6
15-26	8.5	9.2	9.4	0.37	.040	9	10				10.6
26-37	8.9	9.7	9.8	0.19			8				10.6
37-60+	8.9	9.7	9.9	0.14			9				9.9

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS Ca	Mg	H	6P2a Na	6Q2a K	BASE SAT. $NH_4^{\%}Ac$ EXCH.	Base Sat. % on Sum Cations	Sum Bases	Sum Cations	Ca/Mg	4A3a Vol. Wt. c g/cc
	← milliequivalents per 100g. soil →								← me/100 g →			
0-2	15.1				-	1.5						
2-6	18.4				-	1.6						1.20
6-15	18.5				0.1	0.7						
15-26	17.9				0.8	1.0						1.24
26-37	19.1				2.4	1.5						
37-60+	18.5				4.2	1.7						

Soil Type: Colby silt loam.
Location: Hamilton County, Kansas. 100' E of W1/4 corner Sec. 19, T23S, R41W.
Date of Sampling: July 9, 1957.
Collectors: J. S. Allen, C. W. McBee, H. T. Otsuki.
Physiographic Position: Upland. Elevation approximately 3300'.
Climate: Average annual precipitation about 17". Annual temperature about 54°.
Topography: Gently sloping erosional upland below the summit of the High Plains. Loess mantled. Gradient of 2 percent.
Drainage: Well drained.
Vegetation: Blue grama, buffalograss, sand dropseed, annual weeds and grasses.
Use: Native pasture.
Soil No.: S57Kans-38-1.

Depth, Lincoln Lab. No., and Horizon		
0-2" 5917	Ap	Grayish brown (10YR 5/2 dry; 4/2 moist) silt loam; moderate fine platy; slightly hard; friable; calcareous; abrupt smooth boundary to
2-6" 5918	A1	Grayish brown (10YR 5/2 dry; 4/2 moist) silt loam; weak fine granular; slightly hard; friable; calcareous; grades to
6-15" 5919	AC	Grayish brown (10YR 5.5/2 dry; 4.5/2 moist) heavy silt loam; weak coarse prismatic and weak to moderate medium granular; common worm casts which are a mixture of material from above and below; slightly hard; friable; calcareous; grades to
15-26" 5920	ACca	Pale brown (10YR 6.5/3 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; slightly hard; friable; calcareous with 2% of small soft concretions of $CaCO_3$; grades to
26-37" 5921	Cca	Very pale brown (10YR 7/3 dry; 5/3 moist) silt loam; very weak coarse subangular blocky; soft; very friable; calcareous with 1% of small soft concretions of $CaCO_3$; grades to
37-60"+ 5922	C	Very pale brown (10YR 7/3 dry; 5/3 moist) silt loam; massive; soft; very friable; calcareous.

Profiles described by Henry T. Otsuki.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/21/58

SOIL TYPE Colby silt loam **LOCATION** Hamilton County, Kansas

SOIL NOS. S57Kans-38-2 **LAB. NOS.** 5923-5928

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (19mm)	TEXTURAL CLASS
0-2	Ap	4.9a	4.5a	1.7	4.8	15.5	50.6	18.0	55.9	14.0	3.1	sil
2-7	A1	0.9	1.9b	1.2b	4.7b	14.0b	49.9	27.4	51.5	16.3	Tr.	cl
7-18	AC	0.5	0.9b	0.5b	2.9b	10.1b	57.1	28.0	47.2	22.4	Tr.	sicl
18-30	ACca	0.1	0.3b	0.1b	2.8b	10.2b	64.2	22.3	50.8	26.1	Tr.	sil
30-44	AC	0.1	0.2b	0.1b	3.7b	12.9b	64.3	18.7	55.5	24.6	-	sil
44-65+	C	-	0.1b	0.1b	2.1b	16.8b	66.7	14.2	64.6	20.9	-	sil

	pH 8C1a		6A1a ORGANIC MATTER	6B1a		6E1a		MOISTURE TENSIONS		4B2
	1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
	8.1	8.6	8.8	1.20	.097	12.4	-				8.4
	8.2	8.7	8.9	1.23	.128	9.6	14				12.0
	8.1	8.7	8.9	0.71	.075	9	12				12.9
	8.5	9.2	9.4	0.28	.030	9	10				11.3
	8.8	9.5	9.6	0.20			9				10.1
	8.8	9.5	9.7	0.14			9				9.6

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg	4A3a Vol. Wt. c g/cc
	milliequivalents per 100g. soil →							me/100 g →			
18.5	21.2	2.0	-	-	1.4	100	100	24.6	24.6	10.6	
20.9				0.1	1.0						1.20
19.9				0.1	0.9						
20.0				0.9	1.4						1.16
18.5				1.7	1.5						
17.0				2.0	1.4						1.16

a. Some organic matter.
b. Few $CaCO_3$ concr.
c. Based on consistence terminology in the profile descriptions, the horizons were drier than midway between air-dry and field capacity.

R43W. 2 miles N of Coolidge.
Date of Sampling: July 10, 1957.
Collectors: James Allen, C. W. McBee, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 3350'.
Climate: Average annual precipitation about 17". Annual temperature about 54°.
Topography: Gently sloping erosional upland below the summit of the High Plains. Loess mantled. Gradient of 2 percent.
Drainage: Well drained.
Vegetation: Blue grama, buffalograss, sand dropseed, annual weeds and grasses.
Use: Native pasture.
Soil No.: S57Kans-38-2.

Depth, Lincoln Lab. No., and Horizon		
0-2" 5923	Ap	Grayish brown (10YR 5/2 dry; 3.5/2 moist) silt loam; moderate fine platy; slightly hard; friable; calcareous; abrupt smooth boundary to
2-7" 5924	A1	Grayish brown (10YR 5.5/2 dry; 4/2 moist) silt loam; weak fine granular; slightly hard; friable; calcareous; grades to
7-18" 5925	AC	Grayish brown (10YR 5.5/2.5 dry; 4.5/3 moist) heavy silt loam; weak coarse prismatic and weak medium subangular blocky breaking to moderate medium granular; many worm casts which are a mixture of material from above and below; slightly hard; friable; calcareous; grades to
18-30" 5926	ACca	Pale brown (10YR 6/2.5 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse prismatic and weak coarse subangular blocky; slightly hard; friable; calcareous with less than 1% of small soft concretions of $CaCO_3$; grades to
30-44" 5927	AC	Pale brown (10YR 6/2.5 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; slightly hard; friable; calcareous; grades to

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1959

SOIL TYPE Dwight silt loam **LOCATION** Butler County, Kansas

SOIL NOS. S59Kans-8-3 **LAB. NOS.** 10949-10954

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (19mm)	TEXTURAL CLASS
0-5	A1	0.1	0.1	0.1	0.5a	2.8a	73.7	22.7	47.9	28.9	-	sil
5-14	B21	<0.1	0.1	0.1	0.2a	1.1a	48.9	49.6	26.9	23.2	-	sic
14-18	B22	<0.1	<0.1	<0.1	0.1a	1.0a	50.5	48.4	26.5	25.1	Tr.	sic
18-28	B3	0.7b	0.6b	0.4b	0.5c	1.2c	49.5	47.1	24.5	26.5	Tr.	sic
28-35	C1ca	0.4b	0.4b	0.3b	0.5c	1.5c	46.1	50.8	23.6	24.3	Tr.	sic
35-43	C12	0.1d	0.1d	0.1e	0.3e	1.2e	44.5	53.7	21.3	24.6	-	sic

pH 8C1a 1:1	1:5	1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron Fe_2O_3% 6C1a	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.0	6.4	6.4	3.27	0.218	15.0	0.9	0.4					10.7
6.7	7.5	7.5	1.43	0.113	12.6	1.3	0.6					21.9
7.7	8.7	8.8	1.04	0.081	12.8	1.2	1.1					21.1
8.2	9.1	9.3	0.69	0.056	12	1.1	1.7					20.4
8.0	8.7	9.0	0.53			1.3	4.2					22.1
7.8	8.4	8.7	0.43			1.4	6.0					23.9

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5D2 Exch. Na on NH_4Ac CEC %	SATURATION EXT. SOL. 8A1 6P1a Na	6Q1a K	BULK DENSITY 30-Cm. 4B3	4A1c	O.D. 4A1h	8A MOISTURE AT SATURATION
←	milliequivalents per 100g. soil →						<me. per liter>		$\%H_2O$	g/cc	g/cc	%
19.2	10.5	5.0	8.7	0.4	0.5	2	1.8	0.2	28	1.19	1.27	61.6
34.8	15.2	16.6	5.6	4.3	0.5	11	5.2	<0.1			1.75	97.5
34.1	17.1	17.7	2.0	5.4	0.5	13	9.4	0.1				97.3
31.0		18.1	<0.1	7.5	0.5	19	14.4	<0.1	31f	1.34f	1.82	108.6
34.5		19.9	<0.1	10.7	0.5	21	31.2	0.1	32	1.34	1.73	106.2
34.6	15.8	20.4	1.2	12.2	0.6	21	46.1	0.1				105.1

a. Few (Fe-Mn?) concr.
b. Many carbonate concr.
c. Few (Fe-Mn?) concr.; common carbonate concr.
d. Few carbonate concr.
e. Few (Fe-Mn?) concr.; few carbonate concr.
f. Average of two clods.

Soil Type: Dwight silt loam.
Location: Butler County, Kansas: 125 yards south and 50 yards east of NW corner Section 20 T26S R6E.
Date of Sampling: May 12, 1959.
Collectors: Jordan, Post, Penner, and Stout.
Physiographic Position: Nearly level to gently undulating erosional upland having plane and slightly convex surfaces.
Climate: Annual precipitation about 31"; Annual P-E of 53.
Slope: Nearly level, very slightly convex surface having less than 1 percent gradient.
Drainage: Runoff slow to very slow; permeability very slow.
Vegetation: Originally short and mid grass prairie.
Use: Native meadow.
Described by: H. L Penner and M. Stout, Jr.
Soil No.: S59Kans-8-3.

Lincoln Lab. No.		(Sample moist)	
10949	A1	0-5"	Very dark gray (10YR 2.5/1 moist) silt loam; moderate fine and medium granular structure; upper 1" weakly platy; very friable; noncalcareous; boundary smooth and abrupt to
10950	B21	5-14"	Very dark grayish brown and very dark brown (10YR 3/2 and 2/2 moist) clay; weak coarse prismatic structure breaking to weak coarse blocky; distinct, continuous clay films; peds adhere strongly to one another; prisms have very weak, grayish, silty coating that extend about 1 inch into horizon; very firm; noncalcareous; boundary clear and wavy, dipping from 14" to 17" and back to 13" in a 30 inch horizontal width.
10951	B22	14-18"	Very dark grayish brown (10YR 3/2 moist) clay; moderate fine and medium blocky structure; distinct, continuous clay films; peds less adherent than above; few, fine soft $CaCO_3$ concretions; soil mass slightly calcareous in spots; very firm; boundary clear and echoes the wave of the above horizon.
10952	B3	18-28"	Dark brown (10YR 3/2.5 moist) lighter clay; moderate medium blocky structure; distinct, continuous clay films; few vertical seams of very dark gray; many strong slickensides at 35 degrees orientation and layered 1 to 1½ inches apart; few soft $CaCO_3$ concretions and nests; very firm; boundary clear and mostly smooth to
10953	C1ca	28-35"	Same as above horizon; weak blocky, increased $CaCO_3$ masses and concretion; few to common strong and large slickensides at 35 degrees; no grayish seams.

[redacted]

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1959

SOIL TYPE Dwight silt loam LOCATION Butler County, Kansas

SOIL NOS. S59Kans-8-7 LAB. NOS. 10985-10991

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-5	A1	0.3	0.4	0.3a	0.6a	2.3b	72.7	23.4	48.1	27.2	Tr.	sil
5-13	B21t	0.1	0.3	0.2a	0.3a	1.2b	49.1	48.8	28.9	21.6	Tr.	sic
13-20	B22t	0.2	0.3	0.1c	0.1c	1.0c	46.3	51.9	24.5	22.9	Tr.	sic

Soil Type: Dwight silt loam.
Location: Butler County, Kansas; 700 yards north and 225 yards west of the S 1/4 corner Section 14 T24S R7E.
Date of Sampling: May 15, 1959.
Collectors: Jordan, Post, Penner, and Stout.
Physiographic Position: Nearly level to gently undulating erosional upland having plane and slightly convex surfaces.
Climate: Annual precipitation about 31"; Annual P-E of 53.
Slope: Nearly level, slightly convex surface of about 1 percent gradient.

Drainage: Runoff slow; permeability very slow to slow.
Vegetation: Originally short and mid grass prairie.
Use: Native pasture having western wheatgrass, switchgrass and prickly pear.
Described by: H. L. Penner and M. Stout, Jr.
Soil No.: S59Kans-8-7 .

Lincoln Lab. No. (sampled at less than moist conditions)

10985 A1 0-5" Very dark brown (10YR 2/1.5 moist) silt loam; weak fine

SOIL SURVEY LABORATORY

Mandan, North Dakota

SOIL TYPE Ebenezer silt loam (Field No. 64Kc/B-1)

SOIL NO. S-53-Kans-85-3

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 — 1E1a VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	2A2 > 2	TEXTURAL CLASS
1385	0-2	A11	0.3	0.3	0.5	1.6	6.5	67.4	23.4	22.5	52.5	-	sil
1386	2-6	A12	0.1	0.1	0.5	0.6	7.5	62.3	28.9	21.2	48.7	-	sicl
1387	6-9½	AB	0.1	0.1	0.4	1.4	5.2	54.6	38.2	20.3	40.4	-	sicl
1388	9½-17	B21t	-	-	0.1	0.3	2.0	48.2	49.4	23.5	26.9	-	sic
1389	17-24	B22t	0.2	0.2	0.1	0.2	1.5	55.8	42.0	30.0	27.4	-	sic
1390	24-32	B3ca	0.7	0.5	0.4	0.5	2.0	60.2	35.7	32.5	30.0	-	sicl
1391	32-41	Cca	0.1	0.4	0.7	2.0	3.6	64.9	28.3	33.2	36.5	-	sicl
1392	41-51	C1	0.2	0.6	1.4	4.2	5.8	63.0	24.8	31.2	40.1	-	sil
1393	51-60	C2	0.4	0.6	1.5	4.5	6.2	57.0	29.8	28.2	37.8	-	sicl

	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARBON 6A1a	ORGANIC MATTER % NITROGEN 6B1a	ORGANIC MATTER C/N	EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25°C	CaCO3 equivalent per cent 6E1a	GYPSUM me./100g SOIL	MOISTURE TENSIONS (per cent) 1/10 ATMOS.	MOISTURE TENSIONS (per cent) 1/3 ATMOS.	4B2 15 ATMOS
1385	5.7	5.9	5.9	2.71	.240	11.3							12.8
1386	5.6	5.9	6.0	1.85	.176	10.5							14.3
1387	5.6	6.0	6.2	1.42	.146	9.7							18.5
1388	6.3	6.7	7.0	0.92	.086	10.7							25.0
1389	7.4	7.8	8.1	0.56	.067	8.4			1				24.5
1390	7.5	8.4	8.5	0.42	.057	7.4			1				20.1
1391	7.5	8.2	8.4	0.25	.048				1				15.0
1392	7.6	8.1	8.2	0.13	.030				1				11.2
1393	7.4	7.9	7.9	0.10	.031				-				12.4

	5A1a CATION EXCHANGE CAPACITY (NH4Ac)	Extractable CATIONS 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION	8D3 Ca/Mg
	← milliequivalents per 100g soil →						← milliequivalents per liter →							
1385	22.5	12.7	4.6	0.1	1.1									2.8
1386	23.0	11.1	5.6	0.1	0.3									2.0
1387	27.9	18.0	8.1	0.8	0.7									2.2
1388	35.3	22.3	11.0	2.2	0.8									2.0
1389	30.8		10.7	3.2	0.7									
1390	28.8		10.4	4.6	0.5									
1391	23.4		8.2	5.7	0.3									
1392	17.9		6.2	4.5	0.2									
1393	18.4		6.0	4.3	0.2									

EBENEZER SILT LOAM
(Field No. 644C/B-1)

Date: May 19, 1953
County: Saline County, Kansas
Location: Near center of Section 23, T. 13 S., R. 4 W. 150' W and 90' N of the center of the section. Old abandoned school yard.
Vegetation: Almost pure stand of western wheatgrass, with a few plants of dropseed and annual weeds; probably virgin; at least has not been plowed for many years.
Slope: 2½ percent plane slope toward the west. Well drained.
Parent Material: Peoria loess.
Soil No.: S53Kans-85-3.
Described by: W. M. Johnson.
Temperatures: (10:00-10:30 A.M.; partly cloudy). Air, 68° F.; one-inch depth, 66°; 6-inch depth, 56°; 12-inch depth, 62°; 24-inch depth, 60°; 60-inch depth, 62°.

Horizon and Mandan Lab. No.		
A11 1385	0-2"	Dark grayish brown to very dark brown (10YR 4/2 dry; 2/2 moist) soft, friable, moderate fine and medium granular silt loam. Numerous small earthworm casts. Matted with grass roots. Clear lower boundary.
A12 1386	2-6"	Dark grayish brown to very dark brown (10YR 4/1.5 dry; 2/2 moist) soft, friable, moderate coarse and medium granular heavy silt loam. Roots very numerous. Clear lower boundary.
AB 1387	6-9½"	Dark grayish brown to very dark brown (10YR 4/2 dry; 2.5/2.5 moist) friable, moderate coarse and medium granular, heavy silty clay loam. Hard when dry. Roots very numerous. Clear lower boundary.
B21t 1388	9½-17"	Dark grayish brown to very dark brown (10YR 4/2 dry; 2.5/2.5 moist) moderate coarse prismatic, very hard, firm silty clay. Breaks to weak coarse and medium blocks. Roots numerous. Contains a very few tiny iron-manganese "shot" concretions from 1/4 to 1/10 millimeter in diameter. Gradual lower boundary.
B22t 1389	17-24"	Very dark grayish brown (10YR 3/2.5 moist) firm, very hard, weak coarse prismatic silty clay that breaks to strong medium and coarse blocks. Numerous tiny, hard, round calcium-carbonate concretions, especially in the lower 4 inches. Root numerous. Somewhat wavy, gradual lower boundary.
B3ca 1390	24-32"	Very dark grayish brown (10YR 3/2.5 moist), with common inconspicuous fine and medium mottles of brown (moist). Hard, carbonate concretions 1/4 - 1/16 inch in diameter are numerous. Firm, very hard, strong medium and coarse blocky silty clay. Horizontal surfaces of aggregates have very dark brown "skins"; contains an occasional charcoal chip. Roots are numerous, especially in cracks. Diffuse wavy lower boundary.
Cca 1391	32-41"	Very dark grayish brown (10YR 3/2.5 moist), with common to abundant fine and medium mottles of very light gray, white, strong brown and black (moist). Contains numerous hard, rounded, carbonate concretions, from 1/16 to 5/8 inches in diameter. Moderate medium and coarse blocky, firm, heavy silty clay loam. Contains numerous bits of charcoal. Roots are few. This may be weathered Cretaceous shale. Diffuse, wavy lower boundary.
C1 1392	41-51"	Dark brown (10YR 3/3 moist), with numerous fine and medium light gray mottles in the form of films, Threads and spots. Roots very few. Friable, weak fine and medium irregular blocky silty clay loam. Slightly calcareous. Diffuse lower boundary.
C2 1393	51-60"	Variegated light yellowish brown, brown, dark brown and black (10YR 6/4, 7.5YR 4/2, 4/4, and 2/1, moist), moderate medium and fine irregular blocky, friable silty clay loam. There are light gray films on a few of the aggregates. Very few fine roots. Occasional chip of sandstone. Slightly calcareous. Abrupt lower boundary.
IIR	60+"	Cretaceous sandstone. Not sampled.

NOTES: Wide cracks (1/4 to 1/2 inch) are in the B2 horizon, spaced about 12" apart, even though the soil is not air dry.

SOIL SURVEY LABORATORY

Mandan, North Dakota

SOIL TYPE Ebenezer silt loam
(Field No. 34/B-1)

SOIL NO. S-53-Kans-85-4

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm) (per cent) 3A1									2A2	TEXTURAL CLASS
			VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	> 2	
1394	0-2	A11	0.1	0.2	0.9	4.3	8.0	63.6	22.9	20.7	53.5	-	sil
1395	2-5	A12	0.2	0.3	1.2	5.4	8.3	61.1	23.5	21.2	51.6	"	sil
1396	5-8½	A3	0.2	0.3	1.1	5.0	6.4	58.6	28.4	19.5	48.4	"	sicl
1397	8½-11	B1	-	0.2	0.7	3.1	4.8	56.2	35.0	21.9	40.9	"	sicl
1398	11-21	B21t	-	0.1	0.3	0.9	2.1	50.0	46.6	23.7	28.9	-	sic
1399	21-26	B22t	0.9	0.5	0.4	0.8	2.1	55.0	40.3	27.5	30.1	"	sic
1400	26-30	B3ca	1.3	0.4	0.4	1.3	2.4	58.1	36.1	29.7	31.7	"	sicl
1401	30-37	Cca	0.3	0.3	0.6	4.0	4.7	60.2	29.9	29.8	38.1	"	sicl
1402	37-43	Ccs	-	0.2	0.9	7.5	7.7	56.3	27.4	26.9	42.8	"	sicl
1403	43-60+	C	0.3	0.3	1.3	11.8	11.0	47.3	28.0	18.5	48.8	-	cl

LABORATORY NUMBER	pH			ORGANIC MATTER			EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25°C	CaCO3 equivalent per cent 6E1a	GYPSUM me./100g SOIL	MOISTURE TENSIONS		
	8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	% ORGANIC CARBON 6A1a	% NITROGEN 6B1a	C/N					1/10 ATMOS.	(per cent) 1/3 ATMOS	4B2 15 ATMOS.
1394	5.9	6.2	6.3	3.14	.260	12.1							13.1
1395	5.7	5.9	6.0	2.36	.212	11.1							11.9
1396	5.9	6.1	6.3	1.67	.163	10.2							13.8
1397	6.0	6.3	6.4	1.27	.150	8.5							18.1
1398	6.4	6.9	7.0	0.74	.088	8.4							23.1
1399	7.7	8.6	8.8	0.51	.078	6.5			4				20.2
1400	7.9	8.6	8.7	0.36	.050	7.2			2				19.4
1401	7.6	8.5	8.6	0.21	.041				1				16.3
1402	7.3	7.4	7.3	0.13	.032				-				13.1
1403	7.2	7.6	7.6	0.14	.034				-				12.3

LABORATORY NUMBER	5A1a CATION EXCHANGE CAPACITY NH4Ac	Extractable CATIONS 5B1a 6N2b Ca	602b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION	8D3 Ca/Mg
	milliequivalents per 100g soil						milliequivalents per liter							
1394	22.5	13.1	4.7	0.1	1.5									2.8
1395	22.1	12.8	4.5	0.1	1.1									2.8
1396	22.2	12.7	5.3	0.2	1.0									2.4
1397	25.7	14.8	7.7	1.0	1.1									1.9
1398	32.3	20.2	12.5	2.2	0.9									1.6
1399	30.3		12.0	3.6	0.6									
1400	29.2		11.5	5.0	0.5									
1401	24.5		8.9	4.7	0.4									
1402	19.8		6.1	3.7	0.3									
1403	17.6		5.6	3.4	0.2									

AGRICS BELTSVILLE MD 2682 JUNE 1953

EBENEZER SILT LOAM
(Field No. 34/B-1)

Date: May 19, 1953 Described by: W. M. Johnson.
County: Saline County, Kansas
Location: 2/10 miles east and 50 feet south of the NW corner of Section 27, T. 14 S., R. 5 W.
Vegetation: Virgin pasture. Cheatgrass, dropseed, western wheat, big bluestem, annual weeds.
Slope: 4-to 5-percent slightly convex slope toward the southwest. Well drained.
Parent Material: Peoria loess.
Soil No.: S53Kans-85-4.
Temperatures: (2:00-3:00 P.M.; sunny) Air: 73° F; 1-inch depth. 76°; 6-inch depth, 65°; 12-inch depth, 66°; 24-inch depth , 66°; 36-inch depth, 66°; 48-inch depth, 64°; 60-inch depth, 62°.

Horizon and Mandan Lab. No.		
A11 1394	0-2"	Dark gray to very dark brown (10YR 4.5/1, dry; 2/2, moist) weak medium platy, friable silt loam that crushes easily to weak fine granules. Matted with roots. Few wormholes and worm casts. Clear lower boundary.
A12 1395	2-5"	Dark gray to very dark brown (10YR 4.5/1.5, dry; 2/2, moist) weak medium subangular blocky, friable silt loam that crushes easily to weak fine granules. Few worm casts and wormholes. Roots very numerous. Clear lower boundary.
	[illegible]	[illegible]
		Weak subangular blocks of friable silt loam break easily to weak medium and fine granules. Few wormholes and worm casts. Roots very numerous. Clear lower boundary.
B1	8½-11"	Dark grayish brown to very dark grayish brown (10YR 4/2.5, dry;

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Farnum loam **LOCATION** Reno County, Kansas

SOIL NOS. S58Kans-78-5 **LAB. NOS.** 8080-8088

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-9	Ap	0.3a	11.6a	17.3a	10.0a	8.4a	37.9	14.5	39.1	9.8	Tr.	l
9-16	A3	0.3a	11.0a	15.3a	8.9a	6.1a	40.2	18.2	36.8	12.2	-	l
16-22	B1	0.7a	13.9a	17.7a	9.2a	5.2a	29.9	23.4	26.7	10.6	-	l
22-32	B21t	0.1a	10.7a	17.8a	8.9a	8.7a	23.8	30.0	21.8	10.8	-	scl
32-44	B22t	0.4a	6.7a	10.5a	10.2a	7.2a	37.9	27.1	32.6	16.3	Tr.	cl
44-53	B23t	0.3a	2.6a	3.0a	2.2a	8.6a	49.4	33.9	38.2	19.9	Tr.	sicl
53-60	B3	0.6b	5.3b	5.9b	4.0b	13.0b	44.6	26.6	41.9	15.8	Tr.	l
60-76	B3ca	0.5b	7.0b	7.3b	6.1b	16.3b	37.8	25.0	43.9	11.3	0.9	l
76-101	C	1.4b	4.8b	5.3b	9.5b	14.7b	37.5	26.8	47.4	9.9	1.3	l

pH 1:1	pH 1:5	8C1a pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 6A1a	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 4B2 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
5.7	6.0	6.1	0.99	0.082	12	<0.20	0.4					5.7
6.2	6.5	6.7	0.97	0.080	12	<0.20	0.4					7.5
6.8	7.2	7.2	0.65	0.056	12	<0.20	0.5	<1				9.2
6.9	7.4	7.3	0.39	0.040	10	<0.20	0.4	<1				11.4
7.1	7.5	7.5	0.25			<0.20	0.4	<1				10.7
7.2	7.7	7.7	0.24			<0.20	0.3	<1				14.0
7.6	8.0	8.1	0.17			<0.20	0.5	<1				10.9
8.0	8.5	8.5	0.13			<0.20	0.5	6				10.0
8.1	8.7	8.7	0.05			<0.20	0.5	<1				11.7

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH.	SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	8A1	8A MOISTURE AT SATURATION %
←	milliequivalents per 100g. soil →					5C1	← milliequivalents per liter →			
9.9	5.5	1.4	5.5	<0.1	0.7	77	0.4	0.5		29.0
12.8	9.2	2.6	4.1	<0.1	0.7	98	0.4	0.4		42.7
15.5	11.1	3.6	2.8	<0.1	0.5	98	0.5	0.2		47.0
20.0	14.4	5.6	2.8	0.1	0.5	103	0.5	0.1		54.6
18.1	12.8	4.9	2.3	0.1	0.5	101	0.7	0.1		52.0
23.2	16.5	6.2	2.4	0.3	0.7	102	1.0	0.1		69.2
18.7	15.0	4.7	1.9	0.3	0.5	110	1.5	0.1		54.6
16.8				0.4	0.4		2.0	0.1		51.0
19.1				0.8	0.5		2.8	0.1		58.4

a. Few smooth black concr. (Mn?)
b. Few smooth black concr. (Mn?) Also, few $CaCO_3$ concr.

Soil Type: Farnum loam.
Location: Reno County, Kansas. 825' W and 660' S of E¼ Corner of Sec. 5, T24S, R6W. About 6 miles SW of Hutchinson.
Collectors: Jordan, Rockers and Otsuki.
Date of Sampling: May 6, 1958.
Physiographic Position: Upland on Pleistocene mantle presumably old alluvium of sandy to clayey sediments. Elevation approximately 1500'.
Climate: Average annual precipitation about 28".
Topography: Nearly level to weakly billowy; weak convex slope of less than 1 percent.
Drainage: Runoff slow; permeability slow. Moderately well-drained.
Vegetation: Originally tall grass prairie.
Use: Cropland. Now in alfalfa.
Described by: H. T. Otsuki and J. J. Rockers.
Soil No.: S58Kans-78-5.
Lincoln
Lab. No.

8080	Ap	0-9"	Dark grayish brown (10YR 4/1.5 dry; 2/2 moist) loam; weak granular; friable; noncalcareous; grades shortly to
8081	A3	9-16"	Dark grayish brown (10YR 3.5/2 dry; 2.5/2 moist) sandy clay loam; weak granular; moderately friable; many worm casts; noncalcareous; grades through 4" to
8082	B1	16-22"	Dark grayish brown (10YR 4.5/2 dry; 2.5/2 moist; 3/2 moist crushed) heavy sandy loam; weak granular with weak patchy clayskins; moderately firm; many worm casts; grades through 2" to
8083	B21t	22-32"	Dark grayish brown (10YR 4/2 dry; 3/2 moist crushed; with 1Y 3/1.5 coatings on peds) sandy clay with common fine distinct strong brown mottles; moderate medium prismatic breaking to moderate strong medium blocky; prominent continuous clayskins; very firm; few rootlets in peds; most rootlet channels plugged, few open; noncalcareous; grades through 4" to
8084	B22t	32-44"	Grayish brown (10YR 5/2 dry; 3/1.5 moist; 4/2 moist crushed) light sandy clay; moderate medium prismatic breaking to moderately strong medium and coarse blocky with distinct continuous clayskins; firm; common fine distinct strong brown mottles; few rootlet channels in peds; noncalcareous; grades through 2" to
8085	B23t	44-53"	Grayish brown (2.5Y 5/2 dry; 3.5/2 moist; 4/1.5 moist crushed) clay; moderate fine and very fine irregular blocky with distinct continuous clayskins; extremely firm; many rootlet channels penetrate peds; noncalcareous; grades through 4" to
8086	B3	53-60"	Grayish brown (10YR 5/2.5 dry; 3.5/2 moist; 4/3 moist crushed) heavy clay loam; weak moderate medium and coarse irregular and subangular blocky with distinct continuous clayskins; firm; common medium strong brown mottles; few rootlet channels; noncalcareous; grades through 4" to
8087	B3ca	60-76"	Brown (7.5YR 5/4 dry; 4/4 moist; 5/6 moist crushed) heavy sandy clay loam; weak moderate medium irregular blocky; firm; many fine faint strong brown mottles; few fine hard concretions of $CaCO_3$ and many fine to very coarse seams of soft $CaCO_3$; grades to
8088	C	76-101"	Light brown (7.5YR 6/5 dry; 5/3 crushed moist) light sandy clay with many fine reddish yellow mottles; very firm; calcareous; augered.

Remarks: Horizons 0-9"; 44-53" and 60-76" were sampled for Bureau of Public Roads.
Soil was moist to depth sampled.
Except where specified moist, the colors refer to dry soil.

Farnum fine sandy loam. Profiles S58Kans-78-5 and -9 are good representatives of this soil type. The statement of texture of the B2 in the Farnum

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Farnum loam LOCATION Reno County, Kansas

SOIL NOS. S58Kans-73-9 LAB NOS. 8115-8123

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-5	Ap	0.5	11.0	10.4	8.9a	10.3a	44.4	14.5	46.7	11.7	Tr.	1
5-10	A1	0.2	11.2	10.3	8.1a	9.3a	44.7	16.2	45.9	11.5	Tr.	1
10-21	B1	0.6	13.6	11.5	7.9a	8.0a	36.7	21.7	37.8	10.1	Tr.	1

Soil Type: Farnum loam.
Location: Reno County, Kansas. 1668' E and 20' N of W¼ Corner of Sec. 17, T24S, R6W. About 9 miles SW of Hutchinson.
Date of sampling: May 8, 1958.
Collectors: Jordan, Rockers and Otsuki.
Physiographic Position: Upland on Pleistocene mantle presumably old alluvium of sandy to clayey sediments. Elevation approximately 1500'.
Climate: Average annual precipitation about 28".
Topography: Nearly level; gradient about .5 percent.
Drainage: Runoff slow; permeability slow. Moderately well drained.
Vegetation: Originally tall grass prairie.
Use: Cropland.
Described by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-9.

Lincoln Lab. No.			
8115	Ap	0-5"	Grayish brown (10YR 5/2 dry; 2.5/2 moist) light loam; weak granular; very friable; noncalcareous; grades shortly to
8116	A1	5-10"	Very dark grayish brown (10YR 3/2 dry; 2/2 moist) loam; moderate medium platy breaking to weak granular; friable; noncalcareous; grades through 2" to
8117	B1	10-21"	Dark grayish brown (10YR 4/2.5 dry; 2.5/2 moist) sandy clay loam; weak granular with weak patchy clayskins; porous; friable; many wormcasts; noncalcareous; grades through 4" to
8118	B21t	21-29"	Brown (10YR 5/3 dry; 3/3 moist) light sandy clay; moderate fine subangular and angular blocky with distinct continuous clayskins; very firm; many open rootlet channels; many wormcasts; noncalcareous; grades through 4" to
8119	B22t	29-38"	Dark grayish brown (10YR 4/2 dry; 3/2 moist; 4/3 moist crushed) clay; moderate strong medium blocky with distinct continuous clayskins; extremely firm; few faint fine strong brown mottles; few open rootlet channels; noncalcareous grades through 4" to
8120	B23t	38-56"	Brown (10YR 5/3 dry; 4.5/2 moist) light clay; moderate strong medium blocky with distinct continuous clayskins; very firm; many distinct medium strong brown mottles; many open rootlet channels; few scattered wormcasts; noncalcareous; grades through 4" to
8121	B3	56-78"	Grayish brown (1Y 5/2 dry; 4/2 moist; 4/3 moist crushed) light clay; moderate medium subangular and angular blocky with distinct patchy clayskins; very firm; common distinct medium strong brown mottles; mass noncalcareous; many seams and fine soft concretions of $CaCO_3$; many open rootlet channels; grades to
8122	Cca	78-98"	Brownish yellow (10YR 6.5/6 dry; 5.5/6 moist) heavy sandy clay loam, firm; mass calcareous with many large (up to 2") soft concretions of $CaCO_3$; few hard medium concretions of $CaCO_3$; augered; grades to
8123	C	98-108"	Brownish yellow (10YR 6/6 dry; 5/6 moist) sandy clay loam; moderately friable; mass noncalcareous; few fine soft and hard concretions of $CaCO_3$; augered.

Remarks: Horizons 0-5"; 21-29"; and 56-78" were sampled for Bureau of Public Roads.
Soil was moist to depth sampled.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. December, 1959

SOIL TYPE Goessel silty clay LOCATION Butler County, Kansas

SOIL NOS. S59Kans-8-1 LAB. NOS. 10928-10938

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	

Soil Type: Goessel silty clay
Date: May 11, 1959 by Jordan, Post, Penner and Stout.
Area: Butler County, Kansas.
Location: 375 yards E and 50 yards S of NW Cor Sec. 32, T24S, R3E.
Physiographic Position: Nearly level upland on old clayey alluvial sediments.
Climate: Annual precipitation about 31", annual P-E of 53.
Slope: Nearly level to very gently sloping, plane and very slightly convex surface; less than 2 percent gradient.
Drainage: Runoff very slow.
Permeability: Very slow to slow.
Vegetation: Originally tall grass prairie.
Use: Cropland, seeded to alfalfa.
Described by: H. L. Penner and M. Stout, Jr.
Soil No.: S59Kans-8-1.

Lincoln Lab. No.		(sampled wet)	
10928	Ap	0-6"	Black (10YR 2/1 moist) light silty clay; weak fine granular structure; firm; noncalcareous; boundary is smooth and abrupt to
10929	A1	6-15"	Very dark gray (10YR 3.5/1 moist) silty clay, moderate fine irregular blocky structure; very thin, continuous clay films; few, fine, unstained quartz grains adhering to ped faces; many black cracks or seams, both horizontal and vertical; noncalcareous; very firm; boundary smooth and gradual to
10930	AC1	15-24"	Dark gray (2.5Y 4/1 moist) clay; moderate medium irregular angular blocky structure breaking to fine and very fine blocky thin; distinct clay films; weakly expressed slickensides are common, oriented at 45 degrees; less dark gray seams and filled cracks than above; few to common, fine unstained quartz grains on ped surfaces; noncalcareous, boundary smooth and gradual to
10931	AC2	24-33"	Dark grayish brown (2.5Y 4/2 moist) silty clay; moderate medium blocky structure; distinct, continuous clay films; common, weak to moderately expressed slickensides; common very faint grayish brown mottles and very dark gray ped coatings; very firm; noncalcareous; boundary gradual and slightly wavy to
10932	C1	33-44"	Grayish brown (2.5Y 5/2 moist) silty clay; weak medium and coarse blocky structure; thin, continuous clay films; some nearly horizontal planes having thick films on faces, not slickensides; common, fine, faint pale yellowish brown and gray mottles; an occasional dark seam in upper half; common unstained quartz grains; slightly calcareous; very firm; boundary smooth and gradual to
10933	C1cs	44-50"	Grayish brown (2.5Y 5/2 moist) light silty clay; weak medium and coarse blocky structure; thin, mostly continuous clay films; common distinct medium mottles of dark yellowish brown and grayish brown; common gypsum as crystals and very fine white coatings and soft nests; few, soft $CaCO_3$ concretions; few, very dark gray filled root channels; slightly calcareous; very firm; boundary smooth and clear to
10934	C2cs	50-55"	Same color, texture, and structure as preceding horizon; mottled finely with yellowish brown; many prominent gypsum nests and coatings; horizon is discontinuous and pinches out on right side of working face; continuous on left wall of pit; very firm; boundary is otherwise smooth and clear to
10935	C3cs	55-64"	Light brownish gray (2.5Y 6/2 moist) heavy silty clay loam; weak medium and coarse blocky structure; common fine distinct mottles of yellowish brown; gypsum same; firm to very firm; boundary smooth and gradual to
[illegible]			

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1959

SOIL TYPE Goessel silty clay LOCATION Butler County, Kansas

SOIL NOS. S59Kans-8-2 LAB. NOS. 10939-10948

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 1B1a							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 <19mm	
0-6	Ap	0.2	1.6	1.4	1.4	2.0	52.3	41.1	30.9	24.0	-	sic
6-13	A1	0.4	1.4	1.0	1.0	1.5	47.0	47.7	25.7	23.2	-	sic

Soil Type: Goessel silty clay
Date: May 11, 1959 by Jordan, Post, Penner, and Stout.
Area: Butler County, Kansas.
Location: 100 yards N and 50 yards W of E ¼ Cor, Sec. 18, T 24S, R 3E.
Physiographic Position: Nearly level upland on old clayey alluvial sediments.
Climate: Annual precipitation about 31"; annual P-E of 53.
Slope: Nearly level plane surface having a gradient of less than 1 percent.
Vegetation: Originally tall grass prairie.
Use: Cropland.
Described by: H. L. Penner and M. Stout, Jr.
Soil No.: S59Kans-8-2.

Lincoln Lab. No.		(sampled wet)	
10939	Ap	0-6"	Black (10YR 2/1 moist) light silty clay; weak fine granular structure; firm; boundary smooth and abrupt to
10940	A1	6-13"	Black (10YR 2.5/1 moist) silty clay; moderate fine irregular angular blocky structure; thin, continuous clay films; few to common weak slickensides oriented about 45 degrees; very firm; noncalcareous; boundary smooth and gradual to
10941	AC1	13-21"	Very dark gray (10YR 2.5/1 moist) clay; moderate fine irregular angular blocky structure; distinct, continuous clay films; common medium to large, strong slickensides having a 45 degree angle; very firm; noncalcareous; boundary smooth and gradual to
10942	AC2	21-31"	Dark gray (10YR 3.5/1 moist) clay; moderate medium irregular angular blocky structure; distinct, continuous clay films; many strong medium to large slickensides; very faint, fine mottles of light olive brown; common dark gray, fine vertical and horizontal seams or filled cracks; few unstained quartz gravels on peds; very firm; very slightly calcareous in spots; boundary smooth and gradual to
10943	C1	31-44"	Dark gray (3.5Y 4/1 moist) light clay; moderate medium blocky structure; thin, continuous clay films; common, faint, fine light olive brown and gray mottles; few vertical seams of dark gray, about 1/4 inch wide; common, hard, fine $CaCO_3$ concretions and few, fine soft Fe-Mn masses; very firm; slightly calcareous; boundary smooth and gradual to
10944	C2	44-54"	Grayish brown (2.5Y 5/2 moist) light clay; weak medium and coarse blocky structure; thin, mostly continuous clay films; many fine, faint light olive brown and gray mottles; many unstained quartz grains on ped surfaces; very firm; slightly calcareous; boundary smooth and gradual to
10945	C3	54-63"	Grayish brown (2.5Y 5/2 moist) light clay; weak medium and coarse blocky structure; many fine mottles of reddish brown and gray; many, coarser, unstained quartz grains; very firm; slightly calcareous; boundary smooth and gradual to
10946	C4	63-82"	Grayish brown (2.5Y 5/2 moist) silty clay; few to common distinct dark yellowish brown mottles; $CaCO_3$ concretions few to common; calcareous; very firm; augered.
10947	C1ca	82-96"	Olive gray (5Y 5.5/2 moist) light silty clay; common to few, distinct dark yellowish brown mottles; many $CaCO_3$ concretions and soft lime nests and coating; strongly calcareous; very firm; augered.
10948	C2ca	96-106"+	Light olive gray (5Y 6.5/2 moist) light silty clay; common

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/21/58

SOIL TYPE Harney silt loam LOCATION Ford County, Kansas

SOIL NOS. S57Kans-29-1 LAB. NOS. 5959-5966

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1 2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			

Soil Type: Harney silt loam
Location: Ford County, Kansas. 1020' E and 180' S of NW corner Sec. 9, T28S, R24W. About 8 miles SE of Dodge City.
Date of Sampling: July 12, 1957.
Collectors: James Allen, Darold Dodge, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 2600'.
Climate: Average annual precipication about 20". Annual temperature about 54°.
Topography: Nearly level summit of High Plains, mantled with loess. Plane surface with gradient less than 1/2 percent.
Drainage: Well drained.
Vegetation: Bare fallow.
Use: Cropland.
Soil No.: S57Kans-29-1.

Depth, Lincoln Lab. No., and Horizon		
0-6" 5959	Ap	Dark grayish brown (10YR 4/2 dry; 2.5/2 moist) heavy silt loam; weak to moderate fine and medium granular; slightly hard; friable; noncalcareous; abrupt smooth boundary to
6-12" 5960	B1	Dark grayish brown (10YR 4/2 dry; 2.5/2 moist) silty clay loam; weak coarse subangular blocky and moderate medium granular; hard, firm, weak patchy clayskins; noncalcareous; grades to
12-17" 5961	B21t	Dark grayish brown (10YR 4.5/2 dry; 3/2 moist) heavy silty clay loam; weak to moderate coarse prismatic and moderate to strong medium subangular blocky; very hard; firm; distinct continuous clayskins; noncalcareous; grades to
17-25" 5962	B22t	Grayish brown (10YR 5/2 dry; 4/2 moist) heavy silty clay loam; weak to moderate coarse prismatic and moderate to strong medium subangular blocky; very hard; firm; distinct continuous clayskins; noncalcareous; grades to
25-30" 5963	B2ca	Grayish brown (10YR 5.5/2 dry; 4/2 moist) heavy silty clay loam; moderate coarse prismatic and moderate medium and coarse blocky; very hard; firm; weak patchy clayskins; calcareous with few fine soft and hard concretions of $CaCO_3$; grades to
30-38" 5964	B3ca	Pale brown (10YR 6/3 dry; 4.5/3 moist) silty clay loam; moderate medium and coarse prismatic and weak coarse subangular blocky; hard; firm; very weak patchy clayskins; calcareous with coatings of $CaCO_3$ on surface of peds; few fine soft concretions of $CaCO_3$; grades to
38-57" 5965	Cca	Pale brown (10YR 6/3 dry; 4.5/3 moist) light silty clay loam; weak to moderate coarse prismatic and weak coarse subangular blocky, slightly hard; moderately friable; calcareous with coatings of $CaCO_3$ on surface of peds; grades to
57-69" 5966	Ab	Brown (9YR 5.5/3 dry; 4/3.5 moist) light silty clay loam; weak coarse prismatic and weak coarse subangular blocky; slightly hard; moderately friable; calcareous with few fine concretions of $CaCO_3$; diffuse smooth boundary to
69-80" Not sampled	Bb	Brown (8YR 5/3 dry; 4/3 moist) light silty clay loam; weak medium subangular blocky; slightly hard; moderately friable; very weak patchy clayskins; calcareous with few fine soft concretions of $CaCO_3$.

Profiles described by Henry T. Otsuki.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/21/58

SOIL TYPE Harney LOCATION Ford County Kansas

silt loam

SOIL NOS. S57Kans-29-2 LAB. NOS. 5967-5974

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1								2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-5	Ap	0.1	0.3	0.2	0.6	6.3	68.4	24.1	56.4	18.7	-	sil
5-13	B1	-	0.1	0.1	0.4	5.2	64.7	29.5	53.1	17.1	-	sicl
13-22	B21t	-	0.1	0.1	0.1	3.3	58.7	37.7	43.6	18.5	-	sicl
22-28	B22t	0.1	0.1a	0.1a	0.3a	2.3a	53.6	43.5	32.5	23.6	Tr.	sic
28-37	B2ca	0.4a	0.4a	0.1a	0.3a	2.4a	55.9	40.5	33.6	24.9	Tr.	sic
37-50	B3ca	0.7a	0.4a	0.1a	0.3a	2.8a	60.5	35.2	34.3	29.2		sicl

Soil Type: Harney silt loam
Location: Ford County, Kansas. 1390' E and 1400' S of the NW corner Sec. 1, T26S, R24W. About 7 miles NE of Dodge City.
Date of Sampling: July 12, 1957.
Collectors: James Allen, Darold Dodge, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 2600'.
Climate: Average annual precipitation about 20". Annual temperature about 54°.
Topography: Nearly level summit of High Plains, mantled with loess. Plane surface

[redacted]

Drainage: Well drained.
Vegetation: Bare fallow.
Use: Cropland.
Soil No.: S57Kans-29-2.

Depth, Lincoln Lab. No., and	Horizon	
0-5" 5967	Ap	Dark grayish brown (10YR 4/2 dry; 2.5/2 moist) heavy silt loam; weak to moderate medium and fine granular; slightly hard; friable; noncalcareous; abrupt smooth boundary to
5-13" 5968	B1	Dark grayish brown (10YR 4.5/2 dry; 2.5/2 moist) silty clay loam; weak coarse subangular blocky and moderate medium granular; hard; firm; weak patchy clayskins; noncalcareous; grades to
13-22" 5969	B21t	Dark grayish brown (10YR 4.5/2 dry; 3.5/2 moist) heavy silty clay loam; weak coarse prismatic and moderate to strong medium subangular blocky; very hard; firm; distinct continuous clayskins; noncalcareous; grades to
22-28"	B22t	Grayish brown (10YR 5/2 dry; 4/2 moist) heavy silty clay loam;
5970		weak coarse prismatic and strong medium blocky; very hard; firm; distinct continuous clayskins; calcareous; grades to
28-37" 5971	B2ca	Grayish brown (10YR 5/2 dry; 4/2 moist) heavy silty clay loam; weak to moderate medium prismatic and strong medium blocky; very hard; firm; distinct patchy clayskins; calcareous with common fine soft concretions of $CaCO_3$; grades to
37-50"	B3ca	Grayish brown (10YR 5.5/2 dry; 4/2 moist) silty clay loam; weak

[redacted]

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/20/58

SOIL TYPE Keith silt loam **LOCATION** Logan County, Kansas

SOIL NOS. S57Kans-55-1 **LAB. NOS.** 5885-5893

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									TEXTURAL CLASS
		1B1a VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY		2A2	

Soil Type: Keith silt loam.
Location: Logan County, Kansas. 507' N and 317' W of SE corner Sec. 14, T12S, R34W; 14 miles SW of Oakley.
Date of Sampling: July 8, 1957.
Collectors: James Allen, Elbert Bell, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 3300'.
Climate: Average annual precipitation about 19". Annual temperature about 53°.
Topography: Nearly level summit of High Plains mantled with loess. Plane surface with gradient less than 1/2 percent.
Drainage: Well drained.
Vegetation: Clean fallow.
Use: Cultivated land. Broken from virgin sod in 1951.
Soil No.: S57Kans-55-1.

Depth, Inches	Lincoln Lab. No. and Horizon	
0-4"	Ap1	Dark grayish brown (10YR 3.5/1.5 dry; 2.5/2 moist) silt loam;

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/20/58

SOIL TYPE Keith silt loam **LOCATION** Logan County, Kansas

SOIL NOS. S57Kans-55-2 **LAB. NOS.** 5894-5901

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1								2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-4	Ap1	0.2a	0.1	-	0.3	7.5	67.1	24.8	55.0	19.8	-	sil
4-6	Ap2	0.1	0.1	-	0.1	8.9	64.0	26.3	52.3	20.7	-	sil
6-11	A1	0.1	0.1	-	0.2	9.6	60.4	29.6	51.3	18.8	-	sicl
11-17	A3	-	-	-	0.1	9.1	61.5	29.3	53.0	17.7	-	sicl
17-21	B21t	-	-	-	0.1	9.1	63.6	27.2	54.5	18.3	-	sicl
21-33	B22t	-	-	-	0.1	8.3	61.9	29.7	50.2	20.1	-	sicl
33-41	B2ca	-	-	-	0.2	9.3	60.1	30.4	48.4	21.2	-	sicl
41-57	Cca	-	-	-	0.1b	11.4b	65.7	22.8	53.7	23.5	-	sil

Soil Type: Keith silt loam.
Location: Logan County, Kansas. 557' S and 278' E of NW corner Sec. 36, T11S, R35W; 4 miles E of Winona.
Date of Sampling: July 8, 1957.
Collectors: James Allen, Elbert Bell, Henry Otsuki.
Physiographic Position: Upland, elevation approximately 3300'.
Climate: Average annual precipitation about 19". Annual temperature about 53°.
Topography: Nearly level summit of High Plains mantled with loess. Plane surface with gradient less than 1/2 percent.
Drainage: Well drained.
Vegetation: Clean fallow.
Use: Cultivated land. Broken from virgin sod about 1924.
Soil No.: S57Kans-55-2.

Depth, Lincoln Lab. No., and Horizon		
0-4" 5894	Ap1	Dark grayish brown (10YR 4/2 dry; 2.5/2 moist) silt loam; weak very fine and fine granular; slightly hard; friable; noncalcareous; abrupt smooth boundary to
4-6" 5895	Ap2	Dark grayish brown (10YR 4/1.5 dry; 2/2 moist) silt loam; weak coarse platy breaking to fine and medium granular; slightly hard; friable; noncalcareous; abrupt smooth boundary to
6-11"	A1	Very dark grayish brown (10YR 3/1.5 dry; 2/2 moist) heavy silt
5896		loam; moderate medium granular; slightly hard; friable; noncalcareous; grades to
11-17" 5897	A3	Very dark grayish brown (10YR 3/1.5 dry; 2.5/2 moist) light silty clay loam; moderate medium granular; hard; friable; noncalcareous; grades to
17-21" 5898	B21t	Dark grayish brown (10YR 4/2 dry; 3/2 moist) light silty clay loam heavier than above horizon; moderate medium subangular blocky; clayskins weak and patchy; hard; firm; noncalcareous; grades to
21-33" 5899	B22t	Grayish brown (10YR 5.5/2 dry; 4/2 moist) light silty clay loam about same as above; moderate medium subangular blocky; clayskins weak and patchy; hard; firm; calcareous; grades to
33-41" 5900	B2ca	Grayish brown (10YR 5.5/2 dry) light silty clay loam; moderate medium subangular blocky; clayskins weak and patchy; hard; moderately firm; calcareous with about 2% of small soft concretions of $CaCO_3$; grades to
41-57" 5901	Cca	Light brownish gray (10YR 6/2.5 dry; 5/3 moist) heavy silt loam; weak coarse prismatic breaking to weak medium and coarse subangular blocky; slightly hard; friable; calcareous with few small soft concretions and fine threads of $CaCO_3$; grades to
57-70"+ Not sampled	C	Very pale brown (10YR 7/2.5 dry; 5/3 moist) silt loam; massive; soft; very friable; calcareous

SOIL SURVEY LABORATORY

Mandan, North Dakota

SOIL TYPE Lancaster loam
(Field No. 25/B-1)

SOIL NO. S-53-Kans-85-5

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	2A2 > 2	TEXTURAL CLASS
1404	0-1	A11	0.3	0.5	2.0	8.6	11.6	58.1	18.9	18.4	57.1	-	sil
1405	1-5½	A12	0.4	0.5	2.4	20.9	1.7	53.7	20.4	16.7	56.2	-	sil
1406	5½-10	AB	0.6	0.6	2.2	9.6	11.9	49.6	25.5	14.0	53.9	-	l
1407	10-16	B21t	0.2	0.4	2.0	9.8	15.3	43.4	28.9	11.5	54.1	-	cl
1408	16-23	B22t	0.4	0.6	2.2	8.9	11.2	48.3	28.4	14.4	51.0	-	cl
1409	23-34	B3	1.2	0.6	2.0	8.7	11.0	48.7	27.8	12.8	52.7	-	cl

	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARBON 6A1a	ORGANIC MATTER % NITROGEN 6B1a	ORGANIC MATTER C/N	EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM @ 25°C	CaCO3 equivalent per cent 6E1a	GYPSUM me /100g SOIL	MOISTURE TENSIONS 1/10 ATMOS.	MOISTURE TENSIONS (per cent) 1/3 ATMOS.	MOISTURE TENSIONS 15 ATMOS. 4B2
1404	6.7	6.8	6.9	3.93	.318	12.4			-				13.2
1405	5.8	5.9	6.1	2.04	.181	11.3							10.1
1406	5.8	6.0	6.1	1.47	.129	11.4							11.0
1407	5.9	5.9	6.1	1.15	.107	10.7							11.2
1408	5.8	6.0	6.0	0.77	.074	10.4							11.5
1409	6.0	6.1	6.2	0.43	.050	8.6							11.3

	5A1a CATION EXCHANGE CAPACITY	Extractable CATIONS 5B1a 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION
	← NH_4Ac milliequivalents per 100g soil →						← milliequivalents per liter →						
1404	21.8	14.4	5.2	-	1.9								
1405	17.1	9.3	3.6	0.1	0.8								
1406	17.1	9.1	4.2	0.1	0.5								
1407	17.2	9.0	4.8	0.1	0.3								
1408	17.7	9.2	5.6	0.1	0.2								
1409	17.1	8.7	5.9	0.1	0.2								

AGR SCS BELTSVILLE MD 2692 JUNE 1953

LANCASTER LOAM
(Field No. 25/B-1)
(Description by Erick B. Nilson)

Date: May 20, 1953
County: Saline County, Kansas
Location: 175 feet north and 45 feet west of the SE corner of Sec. 17, T. 14 S., R. 4 W.
Vegetation: Virgin pasture. Vegetation is mainly western wheatgrass, sand dropseed, cheatgrass, and annual weeds.
Slope: 3- to 4-percent convex slope toward the SE. Well drained.
Soil No.: S53Kans-85-5.
Temperatures: (10:15 A.M., partly cloudy) Air: 72° F; 1-inch depth, 67°; 6-inch depth, 62°; 12-inch depth, 62°; 24-inch depth, 60°; 36-inch depth, 62°; 48-inch depth, 58°.

Horizon and Mandan Lab. No.		
A11 1404	0-1"	Dark grayish brown to very dark brown (10YR 4/1.5, dry; 2/1.5, moist) weak fine and very fine granular loam. Soft, friable. Matted with roots. Clear lower boundary.
A12 1405	1-5½"	Dark grayish brown to very dark brown (10YR 4/1.5, dry; 2/1.5, moist) slightly hard, friable, weak subangular blocky silt loam that breaks easily to moderate fine and very fine granules. Roots are very numerous. Clear lower boundary.
AB 1406	5½-10"	Brown to very dark brown (7.5YR 4/2, dry; 2/2, moist) moderate medium prismatic sandy clay loam that breaks to weak medium irregular blocks. Very porous. Contains a sprinkling of small sandstone fragments. Roots are numerous. Clear lower boundary.
B21t 1407	10-16"	Brown to very dark brown (7.5YR 4/4, dry; 3/3.5, moist) moderate medium prismatic, friable silty clay loam or sandy clay loam. Prisms break to weak medium and very fine blocks. Contains many sandstone fragments 1/4 to 3/8 inch in diameter. Very porous. Roots are numerous. Gradual lower boundary.
B22t 1408	16-23"	Brown to dark brown (7.5YR 5/5, dry; 3.5/4, moist) friable, weak-prismatic sandy clay loam. Prisms break to irregular blocks and very fine blocks. Contains a moderate number of small sandstone fragments. Roots are numerous. Gradual lower boundary.
B3 1409	23-34"	Mottled strong brown and brown to dark brown (7.5YR 5/6 and 5/4, dry; 4/6 and 4/4, moist) weak medium prismatic sandy clay loam. Prisms break to weak irregular blocks. Roots are numerous. Clear lower boundary.
R	34-41+"	Variegated strong brown and reddish yellow (7.5YR 5/8 and 6/8, dry) with common black spots and seams. Massive layered sandstone and ironstone. Roots are very few.

1410-1415

SOIL SURVEY LABORATORY

Mandan, North Dakota

SOIL TYPE Lancaster loam
(Field No. 25/B-1)
SOIL NO. S-53-Kans-85-6

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY		0.2-	2A2 > 2	TEXTURAL CLASS

LANCASTER LOAM
(Field No. 25/B-1)

Date: May 20, 1953 Described by: W. M. Johnson.
County: Saline County, Kansas
Location: 2/10 mile west and 300 feet south of the NE corner of Sec. 27., T. 14 S., R. 5 W.
Vegetation: Virgin pasture. Principal plants are sand dropseed, little bluestem, cheatgrass, blue grama grass, and annual weeds.
Slope: About 4 percent convex slope toward the north. Well drained.
Parent Material: Weathered Cretaceous sandstone and shale with a little colluvium on the top.
Soil No.: S53Kans-85-6.
Temperatures: (1:00 P.M.; sunny, windy) Air: 84° F.; 1-inch depth, 71°; 6-inch depth, 68°; 12-inch depth, 66°; 24-inch depth, 67°; 36-inch depth, 65°.

Horizon and Mandan Lab.No.		
A11 1410	0-4"	Dark grayish brown to very dark brown (10YR 4/2, dry; 2.5/2.5, moist) weak medium, fine, and very fine granular, very friable loam. Matted with roots. Clear lower boundary.
A12 1411	4-9"	Dark grayish brown to very dark brown (10YR 4/2, dry; 2.5/2.5., moist) soft, friable loam. Weak coarse prisms break to weak medium and fine granules. Roots very numerous. Clear lower boundary.
AB 1412	9-13"	Brown to dark brown (10YR 4.5/3, dry; 3/3, moist) moderate coarse prismatic, friable, heavy loam or light clay loam. Prisms break to weak very fine subangular blocks. Roots are numerous. Gradual lower boundary.
B2 1413	13-19"	Mottled brown and dark grayish brown (10YR 5/3 and 4.5/2.5, dry; 4/4 and 3.5/3, moist) moderate coarse prismatic, friable sandy clay loam. Roots are numerous. Very porous. Gradual lower boundary.
B3 1414	19-27"	Light yellowish brown to yellowish brown (10YR 6/4, dry; 5/4, moist), with a few black spots and common fine and medium mottled of strong brown (moist), weak coarse and medium prismatic, friable sandy clay loam. Very porous. Roots are numerous. Gradual lower boundary.
C1 1415	27-37"	Light yellowish brown to yellowish brown (10YR 6/4, dry; 5/4, moist), with many coarse prominent mottles of light gray, black, and yellowish red. Weak coarse irregular blocky, friable sandy clay loam. Few roots. Abrupt lower boundary.
R	37-42+"	(Not sampled). Stratified gray clay shale and yellowish red sandstone.

SOIL SURVEY LABORATORY
Mandan, North Dakota

SOIL TYPE Lockhard silt loam
(Field No. 364/A-1)
SOIL NO. S-53-Kans-35-1

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	2A2 > 2	TEXTURAL CLASS
			PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										
1367	0-4	Ap	0.1	0.1	0.2	1.3	8.1	68.0	22.2	22.9	54.0	-	sil
1368	4-7	A1	-	-	0.2	0.8	4.7	67.3	27.0	25.0	47.6	-	sil
1369	7-12	B21t	-	0.1	0.2	0.5	2.6	46.7	49.9	22.1	27.5	-	sic
1370	12-24	B22t	-	-	0.1	0.3	2.3	47.7	49.6	24.1	26.1	-	sic
1371	24-29	B23t	-	0.1	0.1	0.3	2.3	50.4	46.8	26.2	26.7	-	sic
1372	29-35	B3ca	1.0	0.4	0.3	0.4	1.8	52.8	43.3	30.3	24.5	-	sic
1373	35-43	Cca	0.2	0.6	0.4	0.6	2.3	63.6	32.3	35.0	31.2	-	sicl
1374	43-49	C1	0.1	0.4	0.4	0.5	2.1	63.4	33.1	37.2	28.6	-	sicl
1375	49-52	A11b	0.1	0.2	0.2	0.4	2.1	62.9	34.1	36.1	29.2	-	sicl
1376	52-62+	A12b	-	-	0.2	1.2	3.9	60.4	34.3	31.4	33.8	-	sicl

LABORATORY NUMBER	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARBON 6A1a	ORGANIC MATTER % NITROGEN 6B1a	ORGANIC MATTER C/N	EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25°C	CaCO3 equivalent per cent 6E1a	GYPSUM me./100g SOIL	MOISTURE TENSIONS 1/10 ATMOS.	MOISTURE TENSIONS (per cent) 1/3 ATMOS.	MOISTURE TENSIONS 15 ATMOS. 4B2
1367	5.7	5.8	6.0	1.02	.091	11.2							9.1
1368	5.5	5.8	5.9	1.07	.089	12.0							12.1
1369	6.0	6.2	6.4	0.94	.089	10.6							24.3
1370	6.7	7.1	7.2	0.66	.070	9.4			1				24.6
1371	7.5	7.9	8.1	0.45	.052	8.6			1				23.9
1372	7.6	8.0	8.3	0.26	.038	6.8			4				22.2
1373	7.4	7.9	8.2	0.08	.025				1				18.4
1374	7.3	7.8	7.8	0.10	.028				-				20.4
1375	7.3	7.6	7.6	0.13	.030				1				19.5
1376	7.1	7.5	7.5	0.22	.050				-				17.7

LABORATORY NUMBER	5A1a CATION EXCHANGE CAPACITY ←NH4Ac	Extractable CATIONS 5B1a 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION	8D3 Ca/Mg
	milliequivalents per 100g soil						← milliequivalents per liter →							
1367	16.9	10.1	4.0	0.1	0.8									2.5
1368	20.9	12.4	4.7	0.4	0.5									2.6
1369	36.0	23.5	10.2	1.0	0.8									2.3
1370	35.0			1.5	0.7									
1371	32.2			2.0	0.8									
1372	30.6			2.3	0.8									
1373	29.0			2.5	0.7									
1374	29.8			2.5	0.7									
1375	29.0			2.6	0.7									
1376	26.6	16.8	7.4	2.2	0.5									2.3

AGR-SCS BELTSVILLE MD 2682 JUNE 1953

LOCKHARD SILT LOAM
(Field No. 364/A-1)

Date: May 18, 1953
County: Saline County, Kansas
Location: 3/10 mi. W and 75' N of SE corner Sec. 5, T. 15 S., R. 3 W.
Vegetation: Cultivated. Last year's cornfield, not plowed this year.
Slope: 1/4 to 1/2 percent, plane.
Parent Material: Eolian silt of early Wisconsin age, probably deposited in shallow water (Peoria age?).
Temperatures: (10:45 A.M.; sunny). Air, 66° F.; 1-inch depth, 67-74°; 6-inch depth, 58°; 12-inch depth, 60°; 24-inch depth, 62°; 36-inch depth, 64°; 48-inch depth, 64°; 60-inch depth, 60°.
Soil No.: S53Kans-85-1.
Described by: W. M. Johnson

Horizon and Mapdan Lab No.		
Ap 1367	0-4"	Grayish brown to very dark grayish brown (10YR 5/1.5 dry; 3.5/1.5 moist) soft, friable, weak fine-granular silt loam. Has a few small and medium indistinct mottles of darker color. Lower boundary is clear.
A1 1368	4-7"	Dark gray to very dark brown (10YR 4/1 dry; 2/2 moist) weak coarse and medium granular, friable, heavy silt loam. Lower boundary is gradual and indistinct.
B21t 1369	7-12"	Dark grayish brown to very dark brown (10YR 3.5/1.5 dry; 2.5/2.5 moist) weak coarse prismatic, heavy silty clay loam or light silty clay that breaks into weak coarse irregular blocks and finally to moderate fine granules. Lower boundary is gradual and indistinct.
B22t 1370	12-24"	Dark gray to very dark brown (10YR 4/1.5 dry; 2.5/1.5 moist) weak coarse prismatic silty clay that breaks to moderate medium and coarse blocks and finally to weak fine blocks. Firm. Surfaces of cracks have gray, bleached silt films. Surfaces of aggregates are very slightly darker and slightly shiny. Lower boundary diffuse.
B23t 1371	24-29"	Dark gray to very dark brown (10YR 4/1.5 dry; 2.5/2.5 moist) moderate medium and coarse blocky, firm silty clay. Breaks with difficulty to weak fine blocks and very fine blocks. Aggregates along cracks have darker colored surfaces. Coarsely wavy, diffuse, indistinct lower boundary.
B3ca 1372	29-35"	Grayish brown to very dark grayish brown (10YR 5/2 dry; 3/2.5 moist) with surface "skins" of 10YR 4.5/2 dry; 2.5/1.5 moist. Firm, moderate medium and coarse blocky silty clay. Contains many hard, rounded, calcium-carbonate concretions from 1/16 to 3/16 inches in diameter and a few rounded iron-manganese "shot" concretions about 1/16 inch in diameter. Lower boundary is indistinct and wavy.
Cca 1373	35-43"	Light gray to grayish brown (10YR 7/1.5 dry; 5/2 moist), with common fine and medium distinct mottles of light yellowish brown and gray (dry). Weak irregular blocky friable silty clay loam. Contains many hard rounded calcium carbonate concretions about 1/8 inch in diameter, and a few tiny iron-manganese "shot" concretions. Indistinct, gradual lower boundary.
C1 1374	43-49"	Light gray to grayish brown (2.5Y 7/2 dry; 5/2 moist), with common prominent fine and medium mottles of reddish yellow and very dark gray (dry). Friable silty clay loam that is massive or weak medium and coarse irregular blocky. Very slightly calcareous. No concretions. Clear lower boundary.
A11b 1375	49-52"	Light gray to grayish brown (2.5Y 7/2 dry; 5/2 moist) with few to common fine distinct mottles of dark brown and very dark gray (both dry). Moderate medium blocky friable silty clay loam. The mottles consist mainly of vertical streaks. Noncalcareous. Diffuse lower boundary.
A12b 1376	52-62"+	Gray to very dark gray (10YR 5/1 dry; 3/1 moist) with common small and medium mottles of brown (dry) and conspicuous light gray and very light gray films over the aggregates. Non-calcareous. Friable moderate fine granular silty clay loam. The mottles consist mainly of vertical streaks.

NOTES: Some tendency toward Grumusolic character may be seen. B_{ca} Horizon is very wavy. At either side of the exposure the carbonate concretions lie within 22 inches of the surface, dropping down to 29 inches at the center of the cut.

SOIL SURVEY LABORATORY

Mandan, North Dakota

SOIL TYPE Lockhard silt loam
(Field No. 364/A-1)

SOIL NO. S-53-Kans-85-2

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	2A2 > 2	TEXTURAL CLASS
1377	0-6	Ap	0.1	0.2	0.4	0.8	7.0	68.1	23.4	23.3	52.3	-	sil
1378	6-10	A1	-	0.2	0.2	0.4	5.2	60.8	33.2	23.4	42.8	-	sicl
1379	10-14	B21t	-	0.1	0.1	0.3	2.9	49.9	46.7	22.1	30.9	-	sic
1380	14-19	B22t	-	0.1	0.1	0.2	2.0	52.0	45.6	27.7	26.4	-	sic
1381	19-28	B23t	-	0.1	0.1	0.2	1.8	49.4	48.4	24.6	26.7	-	sic
1382	28-40	B3ca	1.1	0.4	0.2	0.3	1.6	50.2	46.2	27.7	24.3	-	sic
1383	40-45	Cca	0.1	0.3	0.2	0.2	1.2	55.5	42.0	28.7	28.1	-	sic
1384	45-60+	C	-	-	-	-	2.0	64.1	33.9	32.3	33.8	-	sicl

LABORATORY NUMBER	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARBON 6A1c	ORGANIC MATTER % NITROGEN 6B1c	ORGANIC MATTER C/N	EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25 °C	CaCO3 equivalent per cent 6E1a	GYPSUM me /100g SOIL	MOISTURE TENSIONS 1/10 ATMOS.	MOISTURE TENSIONS (per cent) 1/3 ATMOS	4B2 15 ATMOS
1377	5.6	5.8	5.9	1.16	.100	11.6							9.6
1378	5.8	6.0	6.1	1.11	.111	10.0							15.0
1379	6.0	6.4	6.6	0.84	.087	9.6							22.1
1380	6.3	6.7	7.0	0.61	.066	9.2							26.4
1381	7.0	7.4	7.5	0.49	.055	8.9			1				23.0
1382	7.5	8.3	8.4	0.27	.040	6.8			3				22.6
1383	7.6	8.4	8.5	0.17	.034				2				20.1
1384	7.5	8.2	8.1	0.09	.030				1				19.4

LABORATORY NUMBER	5A1a CATION EXCHANGE CAPACITY 1N4 Ac	Extractable CATIONS 5B1a 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION	8D3 Ca/Mg
	milliequivalents per 100g soil						milliequivalents per liter							
1377	17.5	10.2	3.3	0.1	0.8									3.1
1378	23.9	14.7	4.9	0.5	0.6									3.0
1379	31.9	21.4	7.7	1.1	0.7									2.8
1380	33.1	23.4	8.2	1.3	0.8									2.8
1381	33.1		9.1	1.9	0.8									
1382	31.6		9.2	2.3	0.8									
1383	30.7		8.7	2.6	0.7									
1384	28.4		8.2	2.3	0.6									

AGR-SCS BELTSVILLE, MD 2682 JUNE 1953

LOCKHARD SILT LOAM
(Field No. 364/A-1)

Date: May 18, 1953
County: Saline County, Kansas
Location: 1/8 mi. E and 100' N of the SW corner Sec. 2, T. 15 S., R. 3 W.
Vegetation: Cultivated. Sorghum field that has been recently tilled.
Slope: About 1 percent plane slope toward the east. Moderately well drained.
Parent Material: Eolian silt of Peoria age.
Soil No.: S53Kans-85-2.
Described by: W. M. Johnson.
Temperatures: (3:15 P.M.; soil moist; sunny). Air, 72° F.; one-inch depth, 75°; 6-inch depth, 64°; 12-inch depth 68°; 24-inch depth, 65°; 36-inch depth 65°; 48-inch depth, 65°; 60-inch depth, 61°.

Horizon and Mandan Lab. No.		
Ap 1377	0-6"	Dark gray to very dark brown (10YR 4/1.5 dry; 2/2.5 moist) soft, friable, weak fine-granular silt loam. Abrupt lower boundary.
A1 1378	6-10"	Very dark gray to very dark brown (10YR 3.5/1.5 dry; 2/2 moist) weak fine-granular, friable, heavy silt loam or light silty clay loam. Slightly hard when dry. Gradual lower boundary.
B21t 1379	10-14"	Dark grayish brown to very dark grayish brown (10YR 3.5/2 dry; 3/2.5 moist) moderate coarse-granular, friable, plastic, light silty clay. Very hard when dry. Clear lower boundary.
B22t	14-19"	Dark grayish brown to very dark grayish brown (10YR 3.5/2 dry;

[redacted]

silty clay. Prisms break to weak coarse and medium blocks and finally to moderate fine and very fine blocks. No

SOIL SURVEY LABORATORY
Mandan, North Dakota

SOIL TYPE Muir silt loam
SOIL NO. S-53-Kans-79-2

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 1B1a VERY COARSE SAND 2-1	COARSE SAND 1-0 5	MEDIUM SAND 0.5-0 25	FINE SAND 0 25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0 002	3A1 0.2-0.02	2A2 > 2	TEXTURAL CLASS
2070	0-6	Ap	-	-	0.4	0.6	25.0	61.9	12.1	10.7	76.6	-	sil
2071	6-10	A1	-	-	-	-	15.3	65.0	19.7	17.3	63.0	-	sil
2072	10-17	B2	-	-	-	0.9	16.3	62.7	20.1	17.5	62.4	-	sil
2073	17-29	B3	-	-	-	0.9	17.3	63.2	18.6	15.4	66.0	-	sil
2074	29-40	C1	-	-	-	0.8	19.5	61.6	18.1	13.2	68.7	-	sil
2075	40-56	C2	-	-	1.0	2.4	16.3	61.9	18.4	14.9	64.1	-	sil
2076	56-63	C3	-	-	-	2.3	20.1	61.5	16.1	11.7	70.4	-	sil

	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARBON 6A1a	ORGANIC MATTER % NITROGEN 6B1a	ORGANIC MATTER C/N	EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25°C	CaCO3 equivalent per cent 6E1a	GYPSUM me./100g SOIL	MOISTURE TENSIONS 1/10 ATMOS	MOISTURE TENSIONS (per cent) 1/3 ATMOS.	MOISTURE TENSIONS 4B2 15 ATMOS.
2070	6.6	6.9	7.1	0.78	.071	11.0			-				5.6
2071	6.3	6.6	6.8	0.94	.081	11.6			-				8.9
2072	6.5	6.8	7.0	0.72	.072	10.0			-				9.1
2073	6.6	6.9	7.0	0.45	.049	9.2			-				8.5
2074	7.0	7.3	7.4	0.29	.038	7.6			-				8.0
2075	7.2	7.4	7.6	0.24	.033				-				8.0
2076	7.5	7.8	8.0	0.22	.029				-				6.9

	5A1a CATION EXCHANGE CAPACITY NH4Ac	Extractable CATIONS 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION
	milliequivalents per 100g soil						milliequivalents per liter						
2070	11.6	8.8	2.4	-	0.7								
2071	17.5	13.2	2.4	-	0.5								
2072	17.4	13.1	2.4	-	0.4								
2073	15.3	11.8	2.2	-	0.8								
2074	14.5	11.6	2.0	-	0.8								
2075	14.6	11.8	2.1	-	1.6								
2076	13.2	11.6	1.8	-	1.2								

AGR SCS BELTSVILLE MD 2682 JUNE 1959

MUIR SILT LOAM
(By W. M. Johnson)

Date: October 23, 1953
Location: Republic County, Kansas. 1/4 mile south and 230 feet west of NE¼ corner, Section 9, Township 4 South, Range 4 West.
Physiography: Middle terrace of Republican River Valley. Smooth, gently undulating.
Slope: About 1/2 percent plane slope, facing southeast.
Drainage: Well drained.
Vegetation: Cultivated; corn stubble, with wheat planted in it.
Parent material: Assumed to be Peoria loess.
Classification: Chernozemic Alluvial soil.
Soil No.: S53Kans-79-2.

Mandan Lab. No.			
2070	Ap	0-6"	Dark grayish brown to very dark gray (10YR 4/2. dry: 3/1.

SOIL SURVEY LABORATORY — Mandan, North Dakota

SOIL TYPE Muir loam

SOIL NO. S-53-Kans-79-4

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	2A2 > 2	TEXTURAL CLASS
2084	0-7	Ap	-	0.8	1.3	1.9	31.0	54.6	10.4	7.8	78.8	-	sil
2085	7-17	A1	-	1.1	1.3	1.9	26.2	53.8	15.7	10.3	70.7	-	sil
2086	17-28	B2	-	0.8	0.9	0.9	19.5	57.7	20.2	12.6	65.2	-	sil
2087	28-43	B3	-	-	0.5	0.5	15.4	62.5	21.1	16.8	61.4	-	sil
2088	43-53	C1	-	-	-	0.9	10.4	67.4	21.3	22.6	56.1	-	sil
2089	53-61	C2	-	-	-	-	9.5	67.9	22.6	23.4	54.0	-	sil
2090	61-66	Cca	-	-	-	-	8.4	69.6	22.0	24.6	53.4	-	sil

LABORATORY NUMBER	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARBON 6A1a	ORGANIC MATTER % NITROGEN 6B1a	ORGANIC MATTER C/N	EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25°C	CaCO3 equivalent per cent 6E1a	GYPSUM me./100g SOIL	MOISTURE TENSIONS 1/10 ATMOS.	MOISTURE TENSIONS (per cent) 1/3 ATMOS.	MOISTURE TENSIONS 4B2 15 ATMOS.
2084	5.8	6.0	6.3	0.71	.067	10.6			-				5.0
2085	5.8	6.1	6.3	0.72	.071	10.1			-				7.0
2086	6.4	6.8	6.9	0.00	.066	9.1			-				9.2
2087	6.9	7.0	7.0	0.37	.045	8.2			-				9.4
2088	7.1	7.4	7.5	0.22	.032				-				9.5
2089	7.3	7.5	7.7	0.20	.032				-				10.1
2090	7.6	8.4	8.5	0.16	.029				4				10.2

LABORATORY NUMBER	5A1a CATION EXCHANGE CAPACITY NH4Ac	Extractable CATIONS 5B1a 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION
	← milliequivalents per 100g soil →						← milliequivalents per liter →						
2084	9.8	6.3	1.3	-	0.9								
2085	13.5	8.9	2.1	-	0.6								
2086	15.7	11.6	2.3	-	0.5								
2087	15.7	11.8	2.6	-	0.7								
2088	16.6	12.6	3.1	-	0.8								
2089	17.2	13.0	3.7	-	1.1								
2090	17.2			0.2	1.1								

AGR SCS BELTSVILLE MD 2692 JUNE 1953

MUIR LOAM
(By W. M. Johnson)

Date: October 23, 1953
Location: Republic County, Kansas. 600 feet south and 100 feet west of N¼ corner, Section 33, Township 3 South, Range 4 West.
Physiography: Middle terrace of Republican River; loess mantled.
Parent Material: Calcareous Peoria loess (?).
Slope: About 1/2 percent plane slope toward the west.
Drainage: Well drained. Runoff, slow; permeability, medium.
Vegetation: Cultivated; corn field.
Classification: Chernozemic Alluvial soil.
Soil No.: S53Kans-79-4.

Mandan Lab. No.			
2084	Ap	0-7"	Dark grayish brown to very dark brown (10YR 4/2, dry; 2/2, moist) soft very friable loam or very fine sandy loam. Mixed single grain and very weak coarse subangular blocks (clods) due to tillage. Lower two inches have very weak coarse cleavage. Roots are numerous. pH 5.0. Abrupt smooth lower boundary.
2085	A1	7-17"	Dark grayish brown to very dark gray (10YR 4/2, dry; 3/1, moist) soft friable silt loam. Very weak coarse and very coarse prisms break to very weak fine granules. Worm casts very numerous. Roots numerous. pH 5.0. Clear, smooth lower boundary.
2086	B2	17-28"	Dark grayish brown to very dark grayish brown (10YR 4/2, dry; 3/2, moist) hard friable silt loam. Weak coarse prisms break to weak very fine blocks. Worm casts very numerous. Roots common. Noncalcareous. Very weak, patchy, thin clay "skins". pH 7.0. Gradual, smooth lower boundary.
2087	B3	28-43"	Brown to dark brown (10YR 5/3, dry; 3/3, moist) hard friable heavy silt loam. Weak coarse prisms break to very weak fine irregular blocks. Peds have a very few thin patches of clay "skins." Worm casts common. Few roots. pH 6.5. Gradual, smooth lower boundary.
2088	C1	43-53"	Brown to dark brown (10YR 4/3, dry; 3/3, moist) soft friable silty loam. Weak coarse prisms break to weak very fine irregular blocks. Few roots. Noncalcareous. Worm casts common. Rather prominent clay "skins" on larger surface peds. pH 8.0. Gradual, smooth lower boundary.
2089	C2	53-61"	Brown to dark brown (10YR 5/3, dry; 3/3, moist) soft friable silt loam. Very weak very fine blocky structure. Very few roots. Worm casts common. Noncalcareous. Peds show a few patches of thin clay "skins". pH 7.0. Clear, wavy lower boundary.
2090	Cca	61-66"	Brown to dark grayish brown (10YR 5/3, dry; 4/2, moist) with common medium and fine mottles of white (dry). Soft friable silt loam. Very weak irregular fine blocky structure. There are threads and films of white lime and a few hard round [illegible] concretions about 1/2" in

2001-2007

SOIL SURVEY LABORATORY

Mandan, North Dakota

SOIL TYPE Muir silt loam

SOIL NO. S-53-Kans-89-1

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3a1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	2A2 > 2	TEXTURAL CLASS
2001	0-6	Ap	-	0.3	0.3	0.6	10.1	68.5	20.2	24.1	54.9	-	sil
2002	6-12	A1	-	0.1	0.2	0.6	7.8	70.8	20.5	24.5	54.5	-	sil
2003	12-23	B2	-	-	-	0.6	7.8	68.3	23.3	25.2	51.5	-	sil
2004	23-30	B3	0.1	-	0.1	0.7	8.1	66.3	24.7	25.0	50.0	-	sil
2005	30-44	B2b	-	-	-	1.8	7.0	62.1	29.1	25.5	45.0	-	sicl
2006	44-52	B3b	-	-	-	3.8	13.4	61.9	20.9	21.3	56.7	-	sil
2007	52-62	C	-	-	-	2.8	18.2	60.5	18.5	18.7	62.0	-	sil

	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARRON 6A1a	ORGANIC MATTER % NITROGEN 6B1a	C/N	EST. % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25 °C	CaCO3 equivalent per cent 6E1a	GYPSUM me./100g SOIL	MOISTURE TENSIONS (per cent) 1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS
2001	5.3	5.8	5.8	1.29	.110	11.7			-				8.5
2002	5.4	5.8	6.1	1.33	.110	12.1			-				9.0
2003	6.0	6.2	6.2	1.00	.094	10.6			-				11.2
2004	6.2	6.4	6.4	0.62	.067	9.2			-				11.5
2005	6.2	6.5	6.8	0.46	.057	8.1			-				13.7
2006	6.2	6.4	6.7	0.21	.033				-				9.5
2007	6.3	6.6	6.8	0.14	.024				-				7.6

5A1a CATION	Extractable CATIONS 5B1a	SATURATION EXTRACT SOLUBLE

MUIR SILT LOAM
(By W. M. Johnson)

Date: October 20, 1953
Location: Shawnee County, Kansas. 64/100 miles East, 60 feet South of W¼ corner, Sec. 8, T. 11S., R. 14 E.
Physiography: Nearly level terrace of Kansas River (The Newman Terrace level).
Parent Material: Silt loam alluvium deposited by the Kansas River.
Slope: Nearly level.
Drainage: Moderately well drained. Runoff very slow or lacking; permeability, moderate.
Vegetation: Cultivated corn field. Was green manured with rye last spring and had granular nitrogen fertilizer applied for corn. This is the second year of corn following wheat.
Classification: Minimal Brunizem.

Soil No.: S53Kans-89-1.

Mandan Lab. No.			
2001	Ap	0-6"	Dark gray to black (10YR 4/1, dry; 2/1, moist) soft, friable silt loam. Many clods due to tillage; breaks to mixture of single-grain and weak very fine, fine and medium granules. Some pseudoplatiness at 3" to 5" depth. Roots very numerous. pH 6.0. Abrupt, slightly wavy lower boundary.
2002	A1	6-12"	Dark gray to black (10YR 4/1, dry; 2/1, moist) soft, friable silt loam. Nearly massive, some weak coarse pseudoplates, some tendency toward weak coarse prismatic structure. Roots are numerous. pH 6.0. This and the horizon above probably represent fairly recent flood deposit. Abrupt, smooth lower boundary.
2003	B2	12-23"	Dark grayish brown to very dark brown (10YR 4/2, dry; 2/2, moist) friable, light silty clay loam. Weak, very coarse prisms break to moderate very fine blocks. Aggregates have moderate clay "skins". Worm casts are numerous. Moderate number of fine roots. pH 6.0. Gradual, smooth lower boundary.
2004	B3	23-30"	Brown to very dark grayish brown (10YR 4/3, dry; 3/2, moist) friable silty clay loam. Moderate coarse prisms break to weak very fine blocks with prominent clay "skins". Many worm casts. Few fine roots. There are weak (thin) gray silt films on the vertical cleavage planes. pH 7.0. Gradual, smooth lower boundary.
2005	B2b	30-44"	Dark grayish brown to very dark grayish brown (10YR 4/2 dry; 3/2 moist) friable silty clay loam. Moderate coarse prisms break to weak medium and fine blocks. Aggregates have prominent clay "skins". Worm casts are numerous; porous; few fine roots. pH 7.0. Gradual, smooth lower boundary.
2006	B3b	44-52"	Pale brown to brown (10YR 6/3, dry; 4/3, moist) soft, friable heavy silt loam or light silty clay loam. Weak coarse and very coarse prismatic structure. Noncalcareous Aggregates have moderate clay "skins". Porous due to root holes. Very few fine roots. pH 7.5. Gradual, smooth lower boundary.
2007	C	52-62"+	Pale brown to brown (10YR 6/3, dry; 4/3, moist) friable, soft, heavy silt loam or light silty clay loam. Very weak coarse prismatic structure that has few weak clay "skins". Noncalcareous. Very porous due to root holes. Contains very few fine roots and a few worm casts. pH 7.5.

SOIL SURVEY LABORATORY

Mandan, North Dakota

SOIL TYPE Muir silt loam

SOIL NO. S-53-Kans-89-2

LABORATORY NUMBER	DEPTH IN INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	0.2-0.02	2A2 > 2	TEXTURAL CLASS
2008	0-4½	Ap	0.1	0.1	0.1	0.7	23.8	59.1	16.1	18.7	64.8	-	sil
2009	4½-8	A11	-	0.1	0.1	0.8	23.2	59.3	16.5	18.9	64.2	-	sil
2010	8-12	A12	-	-	-	0.7	22.4	58.4	18.5	19.8	61.7	-	sil
2011	12-25	B2	-	-	-	0.4	16.6	61.1	21.9	22.4	55.6	-	sil
2012	25-33	B3	-	-	-	0.4	12.1	62.6	24.9	23.7	51.3	-	sil
2013	33-44	B2b	-	-	-	0.5	9.8	64.0	25.7	23.0	51.3	-	sil
2014	44-55	B3b	-	-	-	0.2	7.1	69.5	23.2	23.0	53.8	-	sil
2015	55-63	C	-	-	-	0.2	11.6	69.8	18.4	22.4	59.2	-	sil

	pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER % ORGANIC CARBON 6A1a	ORGANIC MATTER % NITROGEN 6B1a	ORGANIC MATTER C/N	EST % SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10 3 MILLIMHOS PER CM @ 25°C	CaCO3 equivalent per cent 6E1a	GYPSUM me./100g SOIL	MOISTURE TENSIONS 1/10 ATMOS	MOISTURE TENSIONS (per cent) 1/3 ATMOS.	MOISTURE TENSIONS 4B2 15 ATMOS
2008	5.7	6.0	6.1	1.23	.107	11.5			-				8.2
2009	5.7	6.2	6.3	1.17	.105	11.1			-				7.0
2010	5.6	6.0	6.2	1.17	.106	11.0			-				8.6
2011	5.9	6.3	6.3	0.90	.083	10.8			-				10.5
2012	6.0	6.4	6.6	0.58	.064	9.1			-				11.6
2013	6.1	6.4	6.4	0.47	.058	8.1			-				12.0
2014	6.3	6.6	6.6	0.31	.045	6.9			-				10.7
2015	7.0	7.1	7.0	0.17	.030				-				8.6

	5A1a CATION EXCHANGE CAPACITY	Extractable CATIONS 5B1a 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	EXCHANGEABLE SODIUM PERCENTAGE ESP	SATURATION EXTRACT SOLUBLE Na	K	CO_3	HCO_3	Cl	SO_4	PER CENT MOISTURE AT SATURATION
	← NH_4Ac milliequivalents per 100g soil →						← milliequivalents per liter →						
2008	15.2	10.5	1.1	-	0.9								
2009	15.4	11.2	1.2	-	0.8								
2010	16.6	11.5	1.4	-	0.6								
2011	18.3	13.3	1.9	-	0.5								
2012	18.6	13.9	1.8	-	0.7								
2013	18.1	14.0	1.4	-	0.7								
2014	16.2	13.3	1.0	0.2	0.6								
2015	13.7	12.4	0.6	0.2	0.5								

ARS SCS BELTSVILLE, MD 2668 JUNE 1953

MUIR SILT LOAM
(By W. M. Johnson)

Date: October 20, 1953
Location: Shawnee County, Kansas. 300 feet South, 40 feet East of NW¼ corner of Sec. 19, T. 11S., R. 15E.
Physiography: Level or nearly level terrace of the Kansas River (Newman terrace).
Slope: Nearly level.
Drainage: Moderately well drained; runoff very slow or lacking; permeability moderate.
Vegetation: Cultivated; corn field. Has been fertilized with ammonium nitrate.
Classification: Minimal Brunizem
Soil No.: S53Kans-89-2.

Mandan Lab. No.			
2008	Ap	0-4½"	Dark gray to very dark gray (10YR 4/1, dry; 3/1, moist) soft, friable loam or silt loam. Cloddy due to tillage; breaks to mixed single grain and very fine, fine and medium granular structure. Roots very numerous. pH 8.0. Abrupt, smooth lower boundary.
2009	A11	4½-8"	Dark grayish brown to black (10YR 4/2, dry; 2/1, moist) soft, friable loam or silt loam. Irregularly stratified and cloddy. Some light and dark mottles due to stratification and earthworm activities. Roots numerous. pH 6.0. This is part of the most recent flood deposit. Abrupt, smooth lower boundary.
2010	A12	8-12"	Dark gray to black (10YR 4/1, dry; 2/1, moist) soft friable, heavy silt loam. Essentially massive; weak tendency to coarse platiness and to coarse prisms. Many worm holes and worm casts. Roots numerous. pH 6.0. Abrupt, smooth lower boundary.
2011	B2	12-25"	Dark grayish brown to very dark grayish brown (10YR 4/2, dry; 3/2, moist) hard, friable, light silty clay loam. Weak very coarse and coarse prisms break to moderate very fine blocks with moderate clay "skins". Very numerous worm casts. Moderate number of roots. pH 6.0. Gradual, smooth lower boundary.
2012	B3	25-33"	Dark grayish brown to very dark brown (10YR 4/2, dry; 2/2 moist) friable, plastic, nonsticky silty clay loam. Weak very coarse and coarse prisms break to moderate very fine blocks. Aggregates have moderate clay "skins". Moderate number of roots. Very numerous worm casts. Moderately porous. pH 6.0. Gradual, smooth lower boundary.
2013	B2b	33-44"	Dark grayish brown to very dark grayish brown (10YR 4/2, dry; 3/2, moist) friable, plastic, nonsticky silty clay loam. Weak very coarse prisms break to moderate very fine blocks with moderate clay "skins". Worm casts very numerous. Roots are few. Porous. pH 6.0. Gradual, smooth lower boundary.
2014	B3b	44-55"	Brown to dark brown (10YR 5/3, dry; 4/3, moist) soft, friable, light silty clay loam. Weak coarse and very coarse prismatic structure with moderate clay "skins". Worm casts very numerous. Porous. Few roots. pH 6.0. Gradual, irregular lower boundary.
2015	C	55-63"	Pale brown to dark brown (10YR 6/3, dry; 4/3, moist) soft, friable, heavy silt loam or light silty clay loam. Massive, with coarse vertical cleavage. No clay "skins", on surfaces. Occasional worm casts. Very few fine roots. Porous. Some spots are slightly calcareous. There are a few white films and an occasional carbonate concretion. pH 8.0. Abrupt, smooth lower boundary.
	Cca	63"+	(Not sampled for analysis). About the same as horizon above, with few white lime threads and films and an occasional hard, round carbonate concretion.

SOIL SURVEY LABORATORY Beltsvill , Maryland

SOIL TYPE Newtonia silt loam **LOCATION** Labette County, Kansas

SOIL NOS. S55Kans-50-1T **LAB. NOS.** 57124-57130

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-8	A1	0.2	0.6	0.6	3.5	7.1	65.6	22.4	42.8	32.6	-	sil
8-14	A3	0.2	0.7	0.6	3.1	6.6	62.1	26.7	38.1	33.0	-	sil/sicl
14-22	B1	0.2	0.9	0.7	3.1	5.3	59.0	30.8	34.5	32.2	-	sicl
22-33	B21	0.4	0.7	0.6	3.0	6.4	53.0	35.9	32.4	29.4	-	sicl
33-54	B22	0.3	0.4	0.4	3.1	6.5	49.1	40.2	33.7	24.5	-	sic/sicl
54-70	B23	0.4	0.8	0.5	3.0	7.2	44.7	43.4	33.4	21.0	-	sic
70-84	B3u?	1.6	1.1	0.6	2.8	5.8	41.8	46.3	29.5	20.3	-	sic

pH 8C1a H_2O 1:1	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron Fe_2O_3%	4A3a Bulk Density g/cc a	$CaCO_3$ equivalent %
6.6	1.78	0.176	10		1.39	
5.6	1.08	0.120	11			
5.1	0.74	0.094	13			
5.2	0.52	0.076	15		1.47	
5.4	0.30	0.051			1.56	
5.5	0.18	0.041				
5.9	0.16	0.040				

5A3a CATION EXCHANGE CAPACITY (Sum)	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % 5C3 (Sum)	Base Sat. % on Sum Cations	Sum Ext. Bases	Sum Ext. Cations	Ca/Mg
	milliequivalents per 100g. soil →									
19.1	11.1	1.8	5.5	0.1	0.6	71				
17.1	6.5	2.0	7.8	0.1	0.7	54				
20.9	6.1	4.4	9.5	0.1	0.8	54				
16.0	7.6	2.3	5.5	0.1	0.5	66				
20.7	8.7	2.4	9.1	0.1	0.4	56				
23.5	12.6	2.2	8.1	0.2	0.4	66				
24.4	13.8	2.2	7.7	0.2	0.5	68				

a-Collected with Uhlen sampling tube by Templin and Ruhe in March, 1956. Samples were in upper half of available moisture range when collected.

Sampled from pit 54 inches deep for laboratory characterization, November 8, 1955, by E. H. Templin, J. T. Neill, R. L. Googins, and D. E. Rott. Described by E. H. Templin, November, 1955.

Location: 1.5 miles west of Labette, Labette County, Kansas; 1,350 feet south and 50 feet east of NW corner of section 27-T32S-R.20E. Freely drained, broadly convex surface of 1 to 2% grade in undulating erosional upland on Pennsylvanian limestone. Site is from a pasture that appears to have never been in cultivation; but only 50 feet from a county road surfaced with limestone gravel. Native vegetation was tall grass prairie with perhaps a few scattered oak trees. The pasture contains scattered Osage-orange, blackjack-oak, and other trees and has a savannah aspect.

Beltsville Lab. No.			(Colors refer to dry soil except where stated moist.)
57124	A1	0-8"	(Sample S55Kans-50-1T-1) Dark brown (7.5YR granular; friable; pH 6.5*
57125	A3	8-14"	(Sample S55Kans-50-1T-2) Brown (7.5YR 4/3; 3/3 when moist) silty clay loam; moderately strong medium granular; friable; no clay skins; pH 5.5*; gradual boundary.
57126	B1	14-22"	(Sample S55Kans-50-1T-3) Reddish brown (5YR 4/4; 3/4 moist) heavy silty clay loam; strong medium to coarse granular; moderate friable; patchy weak clay skins present; pH 5.2*; gradual boundary.
57127	B21	22-33"	(Sample S55Kans-50-1T-4) Reddish brown (5YR 4/4; 3/4, moist) light silty clay; slightly mottled with red (2.5YR 4/5); strong coarse granular; clay skins distinct; moderate friable; fine tubes (rootlet channels) numerous; contains numerous (5%) soft block iron concretions; pH 5.2*; diffuse boundary.
57128	B22	33-54"	(Sample S55Kans-50-1T-5) Red (3YR 4+/5; 4/6, moist) silty clay coarsely mottled with yellowish red (6YR 5/5; 4/5 moist); moderate very coarse granular with distinct clay skins; moderate firm; soft black iron concretions up to a centimeter in diameter are very abundant and constitute an estimated 10% of volume; pH 5.2*; diffuse boundary.
57129	B23	54-70"	(Sample S55Kans-50-1T-6) Red (3YR 4+/5; 4/6, moist) silty clay, much and coarsely mottled with strong brown (7.5YR 5/6, moist); collected with auger and structure not evident; firm; some clay skins apparent in auger core but appear less pronounced than in B22; soft black iron concretions very abundant; moderate firm; pH 6.0*; clear boundary.
57130	B3u(?)	70-84+"	(Sample S55Kans-50-1T-7*) Red (3YR 4/6; 3.5/6, moist) clay streaked with light reddish brown (5YR 6/4) and containing a few fine spots of very pale brown (7.5YR 7/4); firm or very firm; contains some 10% of soft black ferruginous concretions; pH 6.0*. This horizon is interpreted as developed in a clay or marl that underlaid the limestone that weathered to give the overlying horizons.

A few fragments of marine limestone up to two inches in diameter were found at various depths between 24 and 70 inches. None were found below 70 inches.

*pH by Hellige-Truog soil reaction kit

Comments: Apart from the absence of limestone substrata, this profile is believed to be an excellent representative of Newtonia as developed in southeastern Kansas and northeastern Oklahoma.

This profile is slightly less friable in the lower B and less red in the A than the profile near center of section 23-25N-30W, Newton County, Missouri, about midway between Stark City and Newtonia; across road from

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Pratt loamy fine sand LOCATION Reno County, Kansas

SOIL NOS. S58Kans-78-6 LAB. NOS. 8089-8096

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-7	Ap	0.8	13.0	20.4	38.9	16.7	6.9	3.3	39.4	1.9	-	s
7-19	A1	0.6	11.0	18.9	33.1	21.0	9.1	6.3	41.8	2.2	-	ls
19-29	B21t	1.3	13.0	18.0	32.2	17.3	8.6	9.6	38.3	2.7	-	ls
29-38	B22t	0.1	5.9	21.7	37.3	21.0	5.7	8.3	36.8	2.3	-	ls
38-53	C1	0.2	6.2	19.4	45.3	15.6	5.1	8.2	40.3	1.6	-	ls
53-69	C1	0.1	6.8	28.3	42.7	11.8	3.8	6.5	31.4	1.5	-	s
69-76	C	0.2	8.2	24.4	31.4	25.6	3.8	6.4	32.5	1.5	-	s
76-113	C	0.7	7.9	13.6	22.4	29.6	13.2	12.6	48.3	3.2	Tr.	fsl

	pH	8C1a	ORGANIC MATTER 6A1a	6B1a	8A2 EST% SALT	ELECTRICAL CONDUCTIVITY	6E1a $CaCO_3$	GYPSUM	MOISTURE TENSIONS 4B1a	4B1a	4B2

Soil Type: Pratt loamy fine sand.
Location: Reno County, Kansas. 650' W and 700' N of the SE Corner of Sec. 10, T24S, R10W. About 1 mile north of Sylvia.
Date of Sampling: April 7, 1958.
Collectors: Jordan, Rockers, and Otsuki.
Physiographic Position: Undulating upland on comparatively recent sandy eolian deposits. Elevation approximately 1750'.
Climate: Average annual precipitation about 27".
Topography: Gently undulating, convex slope of about 3 percent.
Drainage: Runoff low; permeability rapid.
Vegetation: Originally tall grass prairie.
Use: Cropland.
Description by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-6.

Lincoln Lab. No.			
8089	Ap	0-7"	Grayish brown (10YR 5.5/2 dry; 4/2 moist) light loamy fine sand; single grain; loose; noncalcareous; grades through 1" to
8090	A1	7-19"	Grayish brown (10YR 5/2 dry; 3/2 moist) loamy fine sand; very weak granular to porous massive; very friable; noncalcareous; grades through 4" to
8091	B21t	19-29"	Brown (10YR 5.5/3 dry; 3/3 moist) fine sandy loam; very weak granular to porous massive; very friable; clay coatings and bridges across sand grains; horizontal bands ½ to 1" thick of slightly darker and more clayey material; noncalcareous; grades through 5" to
8092	B22t	29-38"	Brown (10YR 5/3.5 dry; 3.5/4 moist) light fine sandy loamy; very weak granular; very friable; clay coatings and bridges across sand grains; horizontal bands similar to above; grades through 4" to
8093	C1	38-53"	Strong brown (7.5YR 5/6 dry; 4/6 moist) loamy fine sand; porous massive; loose; noncalcareous.
8094	C1	53-69"	Same as above. Horizon was divided for sampling purposes; grades to
8095	C	69-76"	Reddish yellow (7.5YR 6/6 dry; 5/7 moist) fine sand; loose; noncalcareous; augered; grades to
8096	C	76-113"	Same color as above. Fine sand with lenses of heavy sandy clay loam; noncalcareous; augered.

Remarks: Horizons 0-7"; 19-29"; and 53-69" were sampled for Bureau of Public Roads.
Soil was moist to depth sampled.
Except where specified moist, colors refer to dry soil.

Pratt loamy fine sand. Reno County is near the eastern, most humid occurrence of the Pratt series. Accordingly, the base saturation may be lower than average for the series as a whole. Profiles S58Kans-78-6 and-12 seem good representatives of Pratt loamy fine sand as developed in Reno County. E. H. Templin, January 11, 1960.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Pratt loamy fine sand **LOCATION** Reno County, Kansas

SOIL NOS. S58Kans-78-12 **LAB. NOS.** 8143-8150

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-7	Ap	0.3	7.5	23.8	44.8	15.8a	4.2	3.6	36.2	1.4	-	s

Soil Type: Pratt loamy fine sand.
Location: Reno County, Kansas. 600' S and 280' E of W¼ Corner of Sec. 35, T23S, R10W. About 3 miles NE of Sylvia.
Date of Sampling: May 9, 1958.
Collectors: Jordan, Rockers, and Otsuki.
Physiographic position: Undulating upland on comparatively recent sandy eolian deposits. Elevation approximately 1750'.
Climate: Average annual precipitation about 27".
Topography: Gently undulating, convex slope of about 4 percent.
Drainage: Runoff low; permeability rapid.
Vegetation: Originally tall grass prairie.
Use: Cropland.
Described by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-12.

Lincoln Lab. No.			
8143	Ap	0-7"	Pale brown (10YR 6/3 dry; 4.5/3 moist) loamy fine sand; single grain; loose; noncalcareous; grades through 1" to
8144	A1	7-12"	Grayish brown (10YR 5/2 dry; 3/2 moist) loamy fine sand; very weak granular to porous massive; very friable; noncalcareous; grades through 2" to
8145	B21t	12-18"	Brown (10YR 5/3 dry; 3.5/4 moist) light fine sandy loam; very weak granular to porous massive; very friable; clay coatings and bridges across sand grains; horizontal bands ¼ to ½" thick of slightly darker and more clayey material; many fine rootlet channels; noncalcareous; grades through 4" to
8146	B22t	18-28"	Brown (7.5YR 5/5 dry; 4/6 moist) light fine sandy loam; very weak granular; very friable; clay coatings and bridges across sand grains; horizontal bands similar to above but 1/3 to 3/4" thick; many fine rootlet channels; noncalcareous; grades through 3" to
8147	C1	28-41"	Light brown (8YR 6/5 dry; 4/6 moist) loamy fine sand; porous massive; loose; horizontal bands similar to above up to 1/3" thick; horizontal bands up to 1" thick of medium sand; noncalcareous; grades through 4" to
8148	C2	41-50"	Reddish yellow (8YR 6/6 dry; 5/6 moist) fine sand, porous massive; loose; faint thin stratifications with colors 7.5YR 5/8 and 4/4 moist; noncalcareous; grades through 6" to
8149	C3	50-66"	Reddish yellow (8YR 7/6 dry; 5/7 moist) fine sand; porous massive; loose; bandings similar to above; noncalcareous; grades through 6" to
8150	C4	66-98"	Pink (8YR 7/4 dry; 5/6 moist) fine sand; porous massive; loose; noncalcareous; augered.

Remarks: Horizons 0-7"; 18-28"; and 50-66" were sampled for Bureau of Public Roads.
Soil was moist to depth sampled.
Except where specified moist, colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/21/58

SOIL TYPE Richfield silt loam **LOCATION** Hamilton County, Kansas

SOIL NOS. S57Kans-38-3 **LAB. NOS.** 5929-5935

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-4	Ap	0.2	0.3	0.2	1.9	14.5	53.9	29.0	55.8	14.2	-	sicl
4-8	B21t	0.1	0.1	0.1	1.0	9.0	52.3	37.4	45.8	16.3	-	sicl
8-11	B22t	0.1	0.2	0.1	1.7	10.1	49.7	38.1	45.7	15.5	-	sicl
11-24	B2ca	0.1	0.1	-	0.6	6.4	58.9	33.9	40.8	25.0	-	sicl
24-36	Cca	0.1	0.1	-	0.6a	6.0a	66.4	26.8	50.2	22.7	-	sil
36-50	C1	-	0.1	0.1a	0.7a	6.8a	67.7	24.6	48.1	27.0	-	sil
50-72+	C2	-	-	-	0.8a	7.0a	67.6	24.6	48.6	26.7	-	sil

	pH	8C1a	ORGANIC MATTER 6A1a	6B1a			6E1a		MOISTURE TENSIONS		4B2
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N		$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
7.5	8.0	8.1	1.17	.109	10.7		-				12.8
7.1	7.6	7.9	1.02	.101	10.1		1				16.7
7.8	8.5	8.7	0.94	.105	9		1				17.3
8.2	8.7	8.9	0.55	.064	9		18				15.3
8.3	9.1	9.3	0.31				10				13.1
8.6	9.3	9.5	0.23				8				12.3
8.5	9.2	9.4	0.23				8				12.0

5A1a EXTRACTABLE CATIONS 5B1a BASE 5C3 5B1a 5A3a 8D3 4A3a

Soil Type: Richfield silt loam.
Location: Hamilton County, Kansas. 150' E and 165' N of the S1/4 corner Sec. 36, T21S, R41W. 13 miles N of Syracuse.
Date of Sampling: July 10, 1957.
Collectors: James Allen, C. W. McBee, Henry Otsuki.
Physiographic Position: Upland. High Plains table. Elevation approximately 3700'.
Climate: Average annual precipitation about 17". Annual temperature about 54°.
Topography: Nearly level table on the High Plains. Loess mantled. Gradient less than 1/2 percent.
Drainage: Well drained.
Vegetation: Fallow.
Use: Cropland.
Soil No.: S57Kans-38-3.

Depth, Lincoln Lab. No., and Horizon		
0-4" 5929	Ap	Dark grayish brown (10YR 4.5/2 dry; 3/2 moist) heavy silt loam; weak fine granular; slightly hard; friable; noncalcareous; clear smooth boundary to
4-8" 5930	B21t	Dark grayish brown (10YR 4/2 dry; 3/2 moist) silty clay loam; moderate fine subangular blocky; hard; moderately friable to firm; weak patchy clayskins; noncalcareous; grades to
8-11" 5931	B22t	Dark grayish brown (10YR 4/2 dry; 3/2 moist) silty clay loam; weak medium prismatic and moderate to strong medium subangular blocky; hard; firm; distinct continuous clayskins; noncalcareous; grades to
11-24" 5932	B2ca	Grayish brown (10YR 5.5/2 dry; 4/2 moist) silty clay loam; weak medium prismatic and moderate medium subangular blocky; hard; firm; weak patchy clayskins; calcareous with less than 5% of small soft concretions of $CaCO_3$; grades to
24-36" 5933	Cca	Pale brown (10YR 6/3 dry; 4.5/3 moist) light silty clay loam; weak coarse subangular blocky; slightly hard; friable; calcareous with less than 1% of small soft concretions of $CaCO_3$; grades to
36-50" 5934	C1	Pale brown (10YR 6/3 dry; 5/3 moist) silt loam; massive; soft; very friable; calcareous.
50-72"+ 5935	C2	Pale brown (10YR 6/3 dry; 5/3 moist) silt loam; massive; soft; very friable; calcareous.

Profiles described by Henry T. Otsuki.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/21/58

SOIL TYPE Richfield silt loam **LOCATION** Hamilton County, Kansas

SOIL NOS. S57Kans-38-4 **LAB. NOS.** 5936-5942

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-4	Ap	0.2	0.3	0.2	1.4	10.4	59.1	28.4	54.6	16.1	-	sicl
4-8	B21t	-	0.1	0.1	0.5	5.2	60.5	33.6	50.6	15.5	-	sicl
8-13	B22t	-	0.1	-	0.4	6.3	61.2	32.0	50.4	17.4	-	sicl
13-25	B2ca	-	0.1	-	0.5a	5.3a	52.0	42.1	40.6	17.1	-	sic
25-37	Cca	-	-	-	0.6a	6.2a	65.9	27.3	46.6	26.0	-	sicl
37-50	C1	-	0.1	-	0.4a	6.2a	67.6	25.7	50.9	23.2	-	sil
50-62+	C2	-	-	-	0.8a	6.6a	66.9	25.7	47.8	26.4	-	sil

	pH 8C1a		ORGANIC MATTER 6A1a	6B1a				6E1a		MOISTURE TENSIONS		4B2
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N			$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
7.4	7.9	8.0	1.21	.117	10.3			2				12.2
7.1	7.7	7.8	0.68	.079	9			-				14.4
7.2	7.8	8.0	0.56	.065	9			-				14.1
8.2	8.7	8.9	0.40	.046	9			17				14.5
8.2	8.9	9.1	0.27					11				12.6
8.5	9.1	9.3	0.22					9				12.4
8.5	9.2	9.4	0.24					7				12.2

5A1a	EXTRACTABLE CATIONS 5B1a					BASE SAT.	5C3	5B1a	5A3a	8D3	
CATION EXCHANGE CAPACITY NH_4Ac	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	% NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations	Sum Bases	Sum Cations	Ca/Mg	
← milliequivalents per 100g. soil →								← me/100 g →			
22.7		4.0	1.2	-	2.8						

Soil Type: Richfield silt loam.
Location: Hamilton County, Kansas. 280' E and 90' N of the SW corner of Sec. 14, T22S, R40W. 11 miles NE of Syracuse.
Date of Sampling: July 10, 1957.
Collectors: James Allen, C. W. McBee, Henry Otsuki.
Physiographic Position: Upland. High Plains table. Elevation approximately 3650'.
Climate: Average annual precipitation about 17". Annual temperature about 54°.
Topography: Nearly level table on the High Plains. Loess mantled. Gradient less than 1/2 percent.
Drainage: Well drained.
Vegetation: Fallow.
Use: Cropland.
Soil No.: S57Kans-38-4.

Depth, Lincoln Lab. No., and Horizon		
0-4" 5936	Ap	Dark grayish brown (10YR 4.5/2 dry; 3/2 moist) heavy silt loam; weak fine granular; slightly hard; friable; noncalcareous; clear smooth boundary to
4-8" 5937	B21t	Dark grayish brown (10YR 4/2 dry; 3/2 moist) silty clay loam; moderate medium subangular blocky; hard; firm; weak continuous clayskins; noncalcareous; grades to
8-13" 5938	B22t	Dark grayish brown (10YR 4/2 dry; 3/2.5 moist) silty clay loam; weak medium prismatic and moderate to strong medium subangular blocky; hard; firm; distinct continuous clayskins; noncalcareous; grades to
13-25" 5939	B2ca	Light brownish gray (10YR 6.5/2 dry; 5/2.5 moist) silty clay loam; weak medium prismatic and moderate coarse subangular blocky; hard; firm; weak patchy clayskins; calcareous with 5% of small soft concretions of $CaCO_3$; grades to
25-37" 5940	Cca	Light gray (10YR 7/2 dry; 5/2.5 moist) heavy silt loam; weak coarse prismatic and weak coarse subangular blocky; slightly hard; friable; calcareous with less than 1% of small soft concretions of $CaCO_3$; grades to
37-50" 5941	C1	Light gray (10YR 7/2.5 dry; 5/2 moist) silt loam; massive; soft; very friable; calcareous.
50-62"+ 5942	C2	Light gray (10YR 7/2.5 dry; 5/3 moist) silt loam; massive; soft; very friable; calcareous.

Profiles described by Henry T. Otsuki.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Shellabarger fine sandy loam **LOCATION** Reno County, Kansas

SOIL NOS. S58Kans-78-1 **LAB. NOS.** 8047-8054

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-7	Ap	1.4	19.1	19.0	14.4	7.3	29.2	9.6	33.9	6.4	Tr.	sl
7-11	A1	2.7	14.7	15.9	10.5	8.2	29.1	18.9	30.9	7.5	1.9	l/sl
11-19	B21t	19.4	19.5	12.5	9.4	3.0	17.2	19.0	18.1	5.1	9.5	cosl
19-33	B22t	13.3	30.9	18.1	9.0	1.6	7.3	19.8	8.5	3.0	7.2	cosl
33-47	B3	11.3	30.9	22.3	10.8	1.4	7.1	16.2	9.1	1.9	16.2	cosl
47-57	C1	25.6	37.2	16.5	10.7	0.7	1.3	8.0	4.1	0.4	6.8	cos
57-76	C2	44.8	33.9	8.7	3.7	0.4	1.2	7.3	1.7	0.7	22.3	cos
76-100	C3	12.9	42.9	25.7	11.2	1.2	1.2	4.9	4.3	0.5	4.6	cos

pH 1:1	pH 1:5	pH 1:10	8C1a ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a CaCO₃ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
5.7	5.9	6.2	0.59	0.043	14	<0.20	0.3					3.8
6.4	6.6	6.7	0.82	0.065	13	<0.20	0.4					6.7
6.9	7.1	7.1	0.63	0.044	14	<0.20	0.4	<1				6.8
7.4	7.5	7.5	0.36	0.027	13	<0.20	0.4	<1				8.1
7.3	7.4	7.3	0.09			<0.20	0.3	<1				6.5
7.1	7.3	7.1	0.05			<0.20	0.4	<1				3.5
7.1	7.2	7.0	0.03			<0.20	0.4	<1				3.8
7.1	7.3	7.0	0.01			<0.20	0.4	<1				2.2

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5B1a BASE SAT. % NH_4Ac EXCH. 5C1	SATURATION EXTRACT SOLUBLES 6P1a Na	6Q1a K	8A1	8A MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →			
6.3	2.9	0.7	3.2	<0.1	0.5	65	0.4	0.6		22.8
10.4	6.5	2.0	3.2	<0.1	0.5	86	0.4	0.3		33.3
12.5	7.9	2.7	2.3	<0.1	0.4	88	0.4	0.1		33.1
12.9	8.4	3.9	2.3	<0.1	0.3	98	0.4	0.1		35.2
10.7	6.7	3.4	2.3	<0.1	0.3	97	0.5	0.1		35.4
6.1	3.7	1.9	0.9	<0.1	0.2	95	0.6	0.1		26.2
5.1	3.0	1.5	0.4	<0.1	0.1	90	0.7	0.1		26.8
3.3	2.0	0.9	0.4	<0.1	0.1	91	1.0	0.2		27.3

Soil Type: Shellabarger fine sandy loam.
Location: Reno County, Kansas. 900' South and 175' West of the NE Corner of Sec. 11, T26S, R6W. About 17 miles south of Hutchinson.
Date of Sampling: May 5, 1958.
Collectors: Jordan, Rockers and Otsuki.
Physiographic Position: Undulating erosional upland on moderately sandy Pleistocene beds. Elevation approximately 1550'.
Climate: Average annual precipitation about 28".
Topography: Convex slope of about 1.5 percent.
Drainage: Runoff medium; permeability moderate. Well-drained.
Vegetation: Originally tall grass prairie.
Use: Cropland. Now in volunteer wheat.
Described by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-1.

Lincoln Lab. No.			
8047	Ap	0-7"	Dark grayish brown (10YR 4/2 dry; 2.5/2 moist) fine or medium sandy loam; weakly granular; very friable; non-calcareous; pH 5.8; grades shortly to
8048	A1	7-11"	Dark brown (7.5YR 4/2 dry; 3/2 moist) heavy sandy loam; weakly granular to porous massive; friable; few worm casts; noncalcareous; grades through 3" to
8049	B21t	11-19"	Brown (7.5YR 4/3 dry; 3/3 moist; 4/4 moist crushed) sandy clay loam the sand being coarse and very coarse; weak very coarse prismatic and weakly granular; weak patchy clayskins and many clay bridges; moderately firm; few worm casts;
8050	B22t	19-33"	noncalcareous; pH 6.5; grades through 5" to Reddish brown (5YR 4.5/4 dry; 4/4 moist) sandy clay loam; weak very coarse prismatic and weakly granular; weak patchy clay skins and many clay bridges; moderately firm; few pores; noncalcareous; pH 6.5; grades through 8" to
8051	B3	33-47"	Yellowish red (5YR 4/5 dry; 4/6 moist) light sandy clay loam; weak granular; sand grains coated with clay and clay bridges; moderately friable; few scattered fragments of red siltstone; noncalcareous; pH 6.5; grades within 4" to
8052	C1	47-57"	Strong brown (7.5YR 5/6 dry; 5/6 moist) light coarse sandy loam; porous massive; sand grains clay coated; very friable; few rootlet channels; noncalcareous; grades through 10" to
8053	C2	57-76"	Strong brown (7.5YR 5/6 dry; 5/6 moist) coarse loamy sand or sticky sand; porous massive.
8054	C3	76-100"	Same as above. Augered. This horizon was divided for sampling purposes.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Tabler clay loam LOCATION Reno County, Kansas

SOIL NOS. S58Kans-78-7 LAB. NOS. 8097-8105

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1								2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-8	Ap	0.6a	5.3a	4.4b	3.3b	7.1b	51.0	28.3	43.5	15.8	Tr.	sicl
8-16	B21t	0.8a	6.3a	4.8b	3.3b	2.9b	38.6	43.3	24.4	18.3	-	c
16-25	B22t	0.9a	5.7a	4.2b	2.6b	2.4b	42.1	42.1	24.7	20.8	Tr.	sic
25-34	B23tca	1.0a	2.4a	1.7b	1.4b	1.9b	51.0	40.6	27.1	26.4	-	sic
34-39	B31ca	0.4a	0.8a	0.5b	0.6b	2.5b	60.3	34.9	33.3	29.8	-	sicl
39-59	B32ca	0.8a	1.8a	1.4b	2.9b	6.8b	50.0	36.3	35.6	22.8	Tr.	sicl
59-81	B33ca	1.1a	2.6a	2.3b	5.0b	8.7b	42.1	38.2	34.4	19.3	Tr.	sicl
81-97	C1	1.0a	1.9a	2.9b	10.2b	15.7b	46.0	22.3	39.9	28.1	Tr.	l
97-108	C2	1.0c	1.8c	1.7c	5.6c	21.1c	48.4	20.4	45.9	27.1	2.8	l

8C1a ORGANIC MATTER 8A2 ELECTRI... 6E1a MOISTURE TENSIONS

Soil Type: Tabler clay loam.
Location: Reno County, Kansas. 1000' E and 400' N of W¼ Corner, Sec. 16, T24S, R6W. About 8 miles SW of Hutchinson.
Date of Sampling: May 7, 1958.
Collectors: Jordan, Rockers, and Otsuki.

[redacted]

imately 1550'.
Climate: Average annual precipitation about 28".
Topography: Nearly level; gradient about .5 percent.
Drainage: Runoff slow; permeability slow. Moderately well drained.
Vegetation: Originally tall grass prairie.
Use: Cropland.
Description by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-7.

Lincoln Lab. No.			
8097	Ap	0-8"	Dark gray (10YR 4/1 dry; 2/1.5 moist) clay loam; weak granular; firm; noncalcareous; grades shortly to
8098	B21t	8-16"	Very dark gray (10YR 3/1 dry; 2/1.5 moist) clay; weak very fine irregular blocky with weak patchy clayskins; very firm; few rootlet channels; noncalcareous; grades through 2" to
8099	B22t	16-25"	Very dark gray (10YR 3/1 dry; 2.5/1.5 moist) clay; weak fine irregular blocky with distinct continuous clayskins; extremely firm; rootlet channels partially plugged; few faint mottles of 2.5Y 4/2 moist; mass noncalcareous; few fine soft concretions of $CaCO_3$; grades through 4" to
8100	B23tca	25-34"	Light brownish gray (2.5Y 6/2 dry; 4/2 moist) clay; weak blocky to nearly massive with weak patchy clayskins; extremely firm; common distinct fine light olive brown mottles; fine vertical old cracks filled with very dark brown clay loam; calcareous with less than 10% fine and medium concretions of $CaCO_3$; grades through 2" to
8101	B31ca	34-39"	Pale olive (5Y 6/3 dry; 5/3 moist) light clay; weak moderate fine irregular blocky with weak patchy clayskins; very firm; Many open rootlet channels; many distinct fine light olive brown mottles; mass calcareous with many fine concretions of $CaCO_3$; grades through 1" to
8102	B32ca	39-59"	Light brownish gray (2.5Y 6/2 dry and moist; 50% mottled with

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Tabler clay loam **LOCATION** Reno County, Kansas

SOIL NOS. S58Kans-78-8 **LAB. NOS.** 8106-8114

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-5	Ap	0.8	16.2	17.6	11.0a	7.9a	31.1	15.4	31.4	10.2	-	sl
5-8	A1	1.0	9.8	9.3	4.5a	4.5a	34.1	36.8	23.8	15.2	Tr.	cl
8-20	B21t	0.2	5.0	4.8	3.3a	2.2a	38.6	45.9	22.2	19.7	Tr.	c
20-32	B22t	0.4	2.4	2.1	1.0a	2.1a	51.2	40.8	28.1	25.3	Tr.	sic
32-40	B23ca	0.6c	0.7c	0.3c	0.4b	2.7b	62.6	32.7	36.4	29.1	Tr.	sicl
40-61	B31ca	0.6c	2.6c	2.6c	2.2b	7.6b	49.3	35.1	38.6	18.8	Tr.	sicl
61-83	B32ca	1.3	4.7	4.2	6.6a	8.4a	40.1	34.7	38.1	13.4	Tr.	cl
83-97	C1	1.0	5.2	5.1	8.8a	10.4a	34.0	35.5	36.7	12.2	Tr.	cl
97-110	C2	1.6	4.2	3.9	3.0a	11.9a	38.6	36.8	34.9	15.6	Tr.	cl

	pH 8C1a		ORGANIC MATTER 6A1a	6B1a		8A2	ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM 8A1a	6E1a		MOISTURE TENSIONS		4B2
	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N	EST% SALT (BUREAU CUP)		$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
1:1												
6.3	6.6	6.7	1.02	0.091	11.2	<0.20	0.5					6.0
6.7	7.1	7.2	0.97	0.053	18	<0.20	0.5	<1				14.1
7.2	7.9	8.0	0.59	0.037	16	<0.20	0.5	<1				18.5
8.0	8.6	8.8	0.33	0.022	15	<0.20	0.7	1				17.0
8.0	8.6	8.8	0.17			<0.20	1.4	2				14.7
8.2	8.8	8.9	0.18			<0.20	1.2	1				14.0
8.2	8.8	8.8	0.10			<0.20	0.8	1				14.2
8.1	8.7	8.8	0.03			<0.20	0.6	4				16.5
7.7	8.5	8.7	0.02			<0.20	0.6	8				16.4

5A1a	EXTRACTABLE CATIONS 6N2b	6O2b	6H1a	6P2a	5B1a	5I2	SATURATION EXTRACT SOLUBLE 6A1 6P1a	6Q1a				8A
CATION EXCHANGE CAPACITY NH_4Ac	Ca	Mg	H	Na	K	EXCH. Na %	Na	K				MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →					
12.7	9.1	1.9	3.2	<0.1	0.5	<1	0.6	0.4				31.7
27.1	19.8	5.2	3.8	0.4	0.5	1	1.5	0.1				56.6
34.3	25.9	6.9	2.9	1.0	0.6	2	2.1	0.1				79.1
29.4				1.7	0.5	5	3.9	0.1				80.7
25.9				2.4	0.4	8	6.8	0.1				67.1
29.5				2.4	0.3	7	6.9	<0.1				60.5

Soil Type: Tabler clay loam.
Location: Reno County, Kansas. 1420' E and 167' N of SW Corner of Sec. 14, T24S, R6W. About 5 miles south of Hutchinson.
Date of Sampling: May 7, 1958.
Collectors: Jordan, Rockers, and Otsuki.
Physiographic Position: Upland on clayey old alluvial sediments. Elevation [redacted]

Topography: Nearly level; gradient about .5 percent.
Drainage: Runoff slow; permeability slow. Moderately well-drained.
Use: Cropland Vegetation: Originally tall grass prairie.
Described by: J. J. Rockers and H. T. Otsuki.
Soil No.: S58Kans-78-8.

Lincoln Lab. No.			
8106	Ap	0-5"	Very dark gray (10YR 3/1.5 dry; 2/1.5 moist) sandy clay loam; weak granular; friable; noncalcareous; grades shortly to
8107	A1	5-8"	Very dark gray (10YR 3/1 dry; 2/1.5 moist) clay loam; weak granular; firm; noncalcareous; grades through 2" to
8108	B21t	8-20"	Very dark gray (10YR 3/1 dry; 2.5/1.5 moist) clay; weak very fine irregular blocky with weak nearly continuous clayskins; very firm; few open rootlet channels; noncalcareous; grades through 4" to
8109	B22t	20-32"	Light brownish gray (2.5Y 6/2 dry; 5/2 moist) clay; moderate fine irregular blocky with distinct continuous clayskins; extremely firm; rootlet channels partially plugged; fine vertical old cracks filled with very dark brown clay loam; mass noncalcareous; few fine concretions of $CaCO_3$; grades through 8" to
8110	B23ca	32-40"	Light olive gray (5Y 6/2 dry; 5/2 moist) clay; nearly massive; extremely firm; rootlet channels partially plugged; fine vertical old cracks filled with very dark brown clay loam; 10% fine mottles of strong brown and light olive brown; mass calcareous with few fine and medium concretions of $CaCO_3$; grades through 6" to
8111	B31ca	40-61"	Light brownish gray (2.5Y 6/2 dry; 5/2 moist) clay; weak moderate medium subangular and irregular blocky with weak patchy clayskins; very firm; 20 to 30% fine mottles of strong brown and light olive brown; many open rootlet channels; calcareous with common seams and medium concretions of $CaCO_3$; grades through 8" to
8112	B32ca	61-83"	Same as above, excepting strong brown mottles predominate; grades through 6" to
8113	C1	83-97"	Pale olive (5Y 6/3 dry; 5/4 moist) heavy clay loam; firm; calcareous with many fine concretions of $CaCO_3$; many fine strong brown mottles; augered; grades to
8114	C2	97-110"	Pale yellow (5Y 7/3 dry; 6/4 moist) heavy clay loam; firm; calcareous; few fine strong brown mottles; augered.

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Tivoli fine sand **LOCATION** Reno County, Kansas

SOIL NOS S59Kans-78-1 **LAB. NOS.** 9952-9957

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-9	A1	0.1	5.7	22.5	57.1	9.3	3.2	2.1	35.7	1.4	-	fs
9-15	AC	0.4	6.7	23.3	57.4	8.4	1.8	2.0	34.0	1.2	-	fs
15-28	C1	0.1	4.7	21.8	60.0	9.6	1.1	2.7	37.8	0.8	-	fs
28-48	C2	<0.1	3.7	20.1	61.5	10.7	0.9	3.1	40.4	0.6	-	fs
48-68	C3	<0.1	0.4	3.4	71.3	19.8	1.3	3.8	69.8	0.8	-	fs
68-96	C4	0.1	3.6	17.0	57.2	14.7	2.0	5.4	44.0	0.7	-	fs

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM @25°C.	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 4B1a 1/10 ATMOS. %	4B1a 1/3 ATMOS. %	4B2 15 ATMOS. %
6.5			0.27	0.026	10					4.4	2.7	1.1
6.2			0.14	0.017						3.2	2.3	1.2
5.8			0.09	0.008						3.5	2.9	1.3
6.1			0.05							3.6	2.7	1.2
6.3			0.03							5.5	3.6	1.7
6.3			0.04							6.7	4.8	1.8

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Extractable Cations	MOISTURE AT SATURATION %
←	milliequivalents per 100g. soil →							← me/100 g →		
2.3	1.7	0.4	0.8	<0.1	0.2	100	74	2.3	3.1	
2.0	1.2	0.6	2.0	<0.1	0.2	100	50	2.0	4.0	
2.1	1.3	0.4	1.2	<0.1	0.1	86	60	1.8	3.0	
2.1	1.4	0.6	1.2	<0.1	0.1	100	64	2.1	3.3	
2.6	1.7	0.7	1.2	<0.1	0.1	96	68	2.5	3.7	
3.3	2.1	1.1	1.2	<0.1	0.1	100	73	3.3	4.5	

Soil Type: Tivoli fine sand.
Location: Reno County, Kansas. 800 feet south and 225 feet east of the northwest corner of section 9, T 22S, R10W.
Date of Sampling: January 19, 1959.
Collectors: Ratcliff and Bouse.
Physiographic Position: Undulating upland on recent sandy aeolian deposits.
Climate: Average annual precipitation is approximately 27".
Topography: Hummocky topography with hummocks ranging from 4-30 feet in height.
Drainage: Runoff very slow; permeability very rapid.
Vegetation: The native vegetation on this soil is Big Bluestem, Little Bluestem, Indiangrass, and Switchgrass.
Use: Grassland.
Description by: J. J. Rockers and I. W. Ratcliff, Jr.
Soil No.: S59Kans-78-1.

Lincoln Lab. No.			
9952	A1	0-9"	Yellowish brown (10YR 5/3 moist; 5/4 dry); fine sand; loose; single grain to very weak fine granular; many fine roots; noncalcareous; grades within 5 inches -
9953	AC	9-15"	Yellowish brown (10YR 5/4, moist; 5/4, dry); fine sand; single grain; many fine roots; noncalcareous; wavy boundary to
9954	C1	15-28"	Light yellowish brown (10YR 6/4, moist; 6/4, dry); fine sand; single grain; fewer roots than above; noncalcareous; grades within 6" to
9955	C2	28-48"	Light yellowish brown (10YR 6/4 moist; 6/4, dry); fine sand; very porous and massive breaking to single grain with the least amount of pressure; irregular horizontal bands 1/4 to 1/2 inch wide and approximately 6 inches apart which are of slightly higher clay content. These bands are of about two chips less value in color than the matrix; noncalcareous, grades within 6" to
9956	C3	48-68"	Light yellowish brown (10YR 6/4, dry); fine sand, single grain; few roots and few horizontal bands; noncalcareous; grades to
9957	C4	68-96"	Light yellowish brown (10YR 6/4, dry); same as horizon above except for fewer roots and fewer horizonal bands. Augered.

Remarks: The series name of profile S59Kans-78-1 and profile S59Kans-78-2 was changed from "Derby" fine sand to "Tivoli" fine sand in the final correlation. The soil concerned closely resembles Tivoli but of

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Tivoli fine sand LOCATION Reno County, Kansas

SOIL NOS. S59Kans-78-2 LAB. NOS. 9958-9962

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-6	A1	2.2	22.4	27.1	35.6	5.9	4.1	2.7	22.9	1.3	-	s
6-12	AC	1.1	14.4	26.8	46.4	7.8	0.9	2.6	27.6	0.5	-	s
12-32	C1	0.7	11.4	28.1	49.3	6.4	0.6	3.5	26.3	0.4	-	s
32-52	C2	0.5	10.8	24.6	48.9	9.4	1.9	3.9	31.9	0.5	-	s
52-90	C3	0.9	18.5	27.3	41.3	7.7	1.3	3.0	24.9	0.5	-	s

	pH		ORGANIC MATTER				ELECTRICAL CONDUCTIVITY			MOISTURE TENSIONS		
8C1a 1:1	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC×10³ MILLIMHOS PER CM @25°C.	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	4B1a 1/10 ATMOS. %	4B1a 1/3 ATMOS. %	4B2 15 ATMOS. %
5.9			0.34	0.032	11					4.9	3.3	1.4
6.3			0.09	0.013						2.9	1.5	1.0
6.5			0.09	0.010						3.6	2.7	1.1
6.3			0.06							5.2	4.4	1.4
5.7			0.05							3.3	3.6	1.1

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →								< me/100 g >		
2.5	1.8	0.5	1.2	<0.1	0.2	100	68	2.5	3.7	
1.8	1.1	0.5	1.2	<0.1	0.2	100	60	1.8	3.0	
2.1	1.4	0.3	1.6	<0.1	0.1	86	53	1.8	3.4	
2.3	1.4	0.7	1.2	<0.1	0.2	100	66	2.3	3.5	
1.8	1.1	0.4	1.2	<0.1	0.1	89	57	1.6	2.8	

Soil Type: Tivoli fine sand.
Location: Reno County, Kansas. 200 feet north and 100 feet west of the southeast corner of section 28, T22S, R10W.
Date of Sampling: January 19, 1959.
Collectors: Ratcliff and Bouse.
Physiographic Position: Undulating upland on recent sandy aeolian deposits.
Climate: Average annual precipitation is approximately 27".
Topography: Hummocky topography with hummocks ranging from 4 to 30 feet in height.
Drainage: Runoff very slow; permeability very rapid.
Vegetation: The native vegetation on this soil is Big Bluestem, Little Bluestem, Indiangrass, and Switchgrass.
Use: Grassland.
Description by: J. J Rockers

Lincoln Lab. No.			
9958	A1	0-6"	Brown (10YR 4/3, moist; 5/3, dry); fine sand; loose; single grain to very weak granular; many roots; noncalcareous; wavy boundary to
9959	AC	6-12"	Light yellowish brown (10YR 5/4, moist; 6/4, dry); loose fine sand; single grain; many roots; noncalcareous; 30% of this horizon is the same color as the above horizon; grades within 6" to
9960	C1	12-32"	Light yellowish brown (10YR 5/4, moist; 6/4, dry); loose fine sand; single grain; roots are fewer than in horizon above and decrease with depth; few irregular horizontal bands about 1/4 inch wide of slightly higher clay content; noncalcareous; grades within 6" to
9961	C2	32-52"	Light yellowish brown (10YR 5/4, moist; 6/4 dry); fine sand; very porous and massive breaking to single grain with the least amount of pressure; horizontal "layers" of fine sand some 1/2 inch thick containing less clay and of about 1 chip more in value than the mass. This horizon also has some wavy horizontal bands some 1/4 inch wide which approach a loamy sand texture. Noncalcareous; grades within about 6" to
9962	C3	52-90"	Yellowish brown (10YR 5/4 moist; 5/4 dry); fine sand; loose; single grain; "wetting planes" are less pronounced than in horizon above; noncalcareous; not augered.

Remarks: The series name of profiles S59Kans-78-1 and -2 was changed from "Derby" fine sand to Tivoli fine sand in the final correlation. The soil concerned closely resembles Tivoli but of more humid environment and more acid than representative of that series throughout its area of occurrence. The true Derby series is less sandy throughout than as represented in these profiles. Its usual occurrence is no more than a mile from rivers, such as the Cimarron and Arkansas, with braided sand-choked channels from which loess continues to originate. E. H. Templin, January 11, 1960.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/21/58

SOIL TYPE Ulysses loam LOCATION Hamilton County, Kansas

SOIL NOS. S57Kans-38-5 LAB. NOS. 5943-5950

Soil Type: Ulysses loam.
Location: Hamilton County, Kansas. 1000' N and 225' W of SE corner Sec. 27, T25S, R39W. 7 miles SSW of Kendall.
Date of Sampling: July 11, 1957.
Collectors: James Allen, C. W. McBee, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 3400'.
Climate: Average annual precipitation about 17".
Topography: Gently sloping erosional upland. Gradient of 2 percent facing northeast.
Drainage: Well drained.
Vegetation: Sorghums.
Use: Cropland.
Soil No.: S57Kans-38-5.

Depth, Lincoln Lab. No., and Horizon		
0-3" 5943	Ap1	Grayish brown (10YR 5/2 dry; 3/2 moist) heavy fine sandy loam; weak fine granular; soft; very friable; noncalcareous; abrupt smooth boundary to
3-5" 5944	Ap2	Grayish brown (10YR 4.5/2 dry; 3/2 moist) loam; weak coarse platy and weak medium granular; slightly hard; friable; noncalcareous; grades to
5-10" 5945	B21	Grayish brown (10YR 4.5/2 dry; 3/2 moist) light clay loam; weak to moderate medium and fine granular; hard; moderately firm; weak patchy clayskins; calcareous; numerous worm casts which are a mixture of material from above and below; grades to
10-16" 5946	B22	Grayish brown (10YR 5/2 dry; 4/2 moist) light clay loam; weak to moderate medium and fine granular; hard; moderately firm; weak patchy clayskins; calcareous; numerous worm casts which are a mixture of material from above and below; grades to

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/21/58

SOIL TYPE Ulysses loam **LOCATION** Hamilton County, Kansas

SOIL NOS. S57Kans-38-6 **LAB. NOS.** 5951-5958

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-4	Ap1	-	0.3	1.5	40.6	24.3	21.7	11.6	73.5	3.7	-	fsl
4-6	Ap2	0.1	0.2	1.0	26.4	18.8	34.4	19.1	65.1	8.6	-	l
6-9	B21	-	0.1	0.9	24.7	17.6	36.3	20.4	64.3	9.2	-	l
9-14	B22	-	0.1	0.9	23.8	15.6	35.7	23.9	59.8	10.1	-	l
14-23	B31ca	-	0.1	0.8a	20.5a	12.5a	39.1	27.0	52.5	15.0	-	cl/l
23-32	B32ca	-	0.1	0.6b	17.0b	12.0b	44.4	25.9	51.7	18.1	-	l
32-49	C1	-	0.1c	0.5c	17.8c	14.8c	44.7	22.1	55.7	16.4	-	l
49-66+	C2	-	-	0.3d	16.7d	19.5d	46.8	16.7	62.3	17.0	-	l

DEPTH INCHES	pH 8C1a 1:1	1:5	1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
0-4	8.0	8.6	8.7	0.43	.041	10	1				5.0
4-6	7.9	8.4	8.6	0.58	.061	10	-				7.9
6-9	7.9	8.5	8.7	0.56	.059	10	1				8.9
9-14	8.0	8.6	8.8	0.49	.054	9	4				10.2
14-23	8.1	8.6	8.5	0.43	.046	9	11				11.4
23-32	8.1	8.7	8.9	0.31	.034	9	11				10.7
32-49	8.3	8.8	9.0	0.26			7				10.0
49-66+	8.4	8.9	9.1	0.16			7				7.8

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg
	← milliequivalents per 100g. soil →								<me/100 g.>		
0-4	10.2		1.6	0.4	-	1.0					
4-6	14.5	14.1	2.2	0.4	-	1.1	100	98	17.4	17.8	6.4
6-9	15.6				-	0.9					
9-14	14.9				-	0.7					
14-23	16.2				-	0.8					
23-32	15.8				-	1.0					
32-49	16.0				0.1	1.3					
49-66+	14.2				0.3	1.1					

a. Few $CaCO_3$ concr.
b. Common $CaCO_3$ concr.
c. Common $CaCO_3$ concr., also few smooth black concr. (Mn?)
d. Few $CaCO_3$ concr., also few smooth black concr. (Mn?)

Soil Type: Ulysses loam.
Location: Hamilton County, Kansas. 1100' E and 225' N of S1/4 corner Sec. 20, T25S, R39W. 7 miles SW of Kendall.
Date of Sampling: July 11, 1957.
Collectors: James Allen, C. W. McBee, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 3400'.
Climate: Average annual precipitation about 17". Annual temperature about 54°.
Topography: Gently sloping erosional upland. Gradient of 2 percent facing east.
Drainage: Well drained.
Vegetation: Sorghums.
Use: Cropland.
Soil No.: S57Kans-38-6.

Depth, Lincoln Lab. No., and Horizon		
0-4" 5951	Ap1	Grayish brown (10YR 4.5/2 dry; 3/2 moist) heavy fine sandy loam; weak fine granular; soft; very friable; noncalcareous; abrupt smooth boundary to
4-6" 5952	Ap2	Dark grayish brown (10YR 4/2 dry; 3/2 moist) loam; weak coarse platy to nearly massive; slightly hard; friable; noncalcareous; grades to
6-9" 5953	B21	Grayish brown (10YR 4.5/2 dry; 3/2 moist) light clay loam; moderate medium and fine granular; hard; moderately firm; weak patchy clayskins; noncalcareous; grades to
9-14" 5954	B22	Grayish brown (10YR 5/2 dry; 4/2 moist) light clay loam; weak medium subangular blocky and moderate medium granular; hard; moderately firm; weak patchy clayskins; calcareous; grades to
14-23" 5955	B31ca	Grayish brown (10YR 5.5/2 dry; 4.5/2.5 moist) light clay loam; weak coarse prismatic and weak coarse subangular blocky; hard; moderately friable; calcareous with few fine soft concretions of $CaCO_3$; grades to
23-32" 5956	B32ca	Pale brown (10YR 6/3 dry; 4.5/3 moist) loam; weak coarse prismatic and weak coarse subangular blocky; slightly hard; friable; calcareous with few to common fine soft concretions of $CaCO_3$; grades to
32-49" 5957	C1	Pale brown (10YR 6.5/3 dry; 5/3 moist) loam; weak coarse subangular blocky to nearly massive; soft; friable; calcareous; grades to
49-66"+ 5958	C2	Very pale brown (10YR 7/3 dry; 5/3 moist) loam; massive; soft; friable; calcareous.

Profiles described by Henry T. Otsuki.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/20/58

SOIL TYPE Ulysses silt loam **LOCATION** Logan County, Kansas

SOIL NOS. S57Kans-55-3 **LAB. NOS.** 5902-5908

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-5	Ap	0.2	0.4	0.3	0.6	10.7	62.7	25.1	55.7	18.0	-	sil
5-7	A1	0.1	0.2	0.1	0.5	9.3	61.9	27.9	52.6	18.9	-	sicl
7-14	B2	0.1	0.1	0.1	0.3	8.3	61.3	29.8	50.6	19.2	-	sicl
14-25	B2ca	0.1	0.1	0.1a	0.1a	8.9a	64.8	25.9	49.8	24.0	-	sil
25-36	B3	-	0.1	0.1a	0.1a	9.7a	68.1	21.9	52.6	25.3	-	sil
36-48	C1	-	0.1	-	0.1a	11.4a	71.3	17.1	58.7	24.1	-	sil

Soil Type: Ulysses silt loam.
Location: Logan County, Kansas. 653' E and 233' S of W1/4 corner Sec. 36, T12S R35W. 7 miles SE of Winona.
Date of Sampling: July 8, 1957.
Collectors: James Allen, Elbert Bell, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 3200'.
Climate: Average annual precipitation about 18". Annual temperature about 53°.
Topography: Nearly level table below the summit of the High Plains mantled with loess. Gradient less than 1 percent.
Drainage: Well drained.
Vegetation: Clean fallow.
Use: Cultivated land. Broken from virgin sod in 1929.
Soil No.: S57Kans-55-3.

Depth, Lincoln Lab. No., and Horizon		
0-5" 5902	Ap	Dark grayish brown (10YR 4/1.5 dry; 3/2 moist) silt loam; weak fine and very fine granular; slightly hard; friable; noncalcareous; abrupt smooth boundary to
5-7" 5903	A1	Dark grayish brown (10YR 4/2 dry; 2.5/2 moist) heavy silt loam; moderate fine granular; slightly hard; friable; weakly calcareous; grades to
7-14" 5904	B2	Grayish brown (10YR 5/2 dry; 3.5/2 moist) light silty clay loam; weak medium subangular blocky and moderate fine granular; clay-skins weak and patchy; hard; moderately firm; calcareous; grades to
14-25" 5905	B2ca	Light gray (10YR 7/2 dry; 5.5/2.5 moist) heavy silt loam; weak coarse prismatic and weak coarse subangular blocky; slightly hard; friable; calcareous with fine threads of $CaCO_3$ on surface of peds; grades to
25-36" 5906	B3	Light gray (10YR 7/2.5 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; soft; very friable; calcareous;
36-48" 5907	C1	Light gray (10YR 7/2.5 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; soft; very friable; calcareous; diffuse smooth boundary to
48-63"+ 5908	C2	Light gray (10YR 7/2.5 dry; 5/3 moist) silt loam; massive; soft; very friable; calcareous.

Profiles described by Henry T. Otsuki.
Except where specified moist, the colors refer to dry soil.

SOIL SURVEY LABORATORY Lincoln, Nebr. 5/20/58

SOIL TYPE Ulysses silt loam **LOCATION** Logan County, Kansas

SOIL NOS. S57Kans-55-4 **LAB. NOS.** 5909-5916

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 1B1a							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-3	Ap	0.2	1.2	1.6	1.6	14.3	55.6	25.5	57.1	13.5	-	sil
3-5	A1	0.2	1.2	1.7	1.4	13.2	54.5	27.8	54.8	13.3	-	sicl
5-9	B21	0.1	1.3	1.9a	1.4a	11.8a	53.2	30.3	54.4	14.0	-	sicl
9-13	B22	0.1	1.1	1.6	1.4	10.6	48.3	36.9	44.9	14.6	-	sicl
13-25	B2ca	0.1	0.1	0.2	0.3b	9.5b	61.4	28.4	48.7	22.4	-	sicl
25-38	B3	0.1b	0.1b	-	0.2b	11.2b	65.5	22.9	54.2	22.7	-	sil
38-50	C1	-	0.1	0.1b	0.1b	12.4b	66.5	20.8	55.7	23.3	-	sil

Soil Type: Ulysses silt loam.
Location: Logan County, Kansas. 292' N and 151' W of E1/4 corner Sec. 13, T13S, R36W. 4 miles W of Russell Springs.
Date of Sampling: July 9, 1957.
Collectors: James Allen, Elbert Bell, Henry Otsuki.
Physiographic Position: Upland. Elevation approximately 3200'.
Climate: Average annual precipitation about 18". Annual temperature about 53°.
Topography: Nearly level table below the summit of the High Plains mantled with loess. Gradient less than 1 percent.
Drainage: Well drained.
Vegetation: Sorghums.
Use: Cultivated land. Broken from virgin sod about 1947.
Soil No.: S57Kans-55-4.

Depth, Lincoln Lab. No., and Horizon		
0-3" 5909	Ap	Dark grayish brown (10YR 4.5/2 dry; 3/2 moist) silt loam; weak fine and very fine granular; slightly hard; friable; noncalcareous; abrupt smooth boundary to
3-5" 5910	A1	Dark grayish brown (10YR 4.5/2 dry; 3/2 moist) silt loam; weak to moderate medium subangular blocky and granular; slightly hard; friable; noncalcareous; grades to
5-9" 5911	B21	Dark grayish brown (10YR 4.5/2 dry; 3/2 moist) light silty clay loam; weak medium subangular blocky and moderate medium granular; clayskins weak and patchy; hard; moderately firm; noncalcareous; grades to
9-13" 5912	B22	Grayish brown (10YR 5.5/2 dry; 4/2 moist) light silty clay loam; weak medium subangular blocky and moderate medium granular; clayskins weak and patchy; hard; moderately firm; calcareous; grades to
13-25" 5913	B2ca	Light brownish gray (10YR 6.5/2 dry; 5.2/5 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; soft; very friable; calcareous with common fine threads of $CaCO_3$; grades to
25-38" 5914	B3	Light brownish gray (10YR 6.5/2 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; soft; very friable; calcareous;
38-50" 5915	C1	Light brownish gray (10YR 6.5/2 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; soft; very friable; calcareous;
50-63" 5916	C2	Light brownish gray (10YR 6.5/2 dry; 5/3 moist) silt loam; weak coarse prismatic and weak coarse subangular blocky; soft; very friable; calcareous; grades slowly to
63-70"+ Not sampled	C3	Very pale brown (10YR 7/3 dry; 5/3.5 moist) silt loam; massive; soft; very friable; calcareous.

Profiles described by Henry T. Otsuki.
Except where specified moist, the colors refer to dry soil.

*U. S. GOVERNMENT PRINTING OFFICE : 1966 O - 223-875